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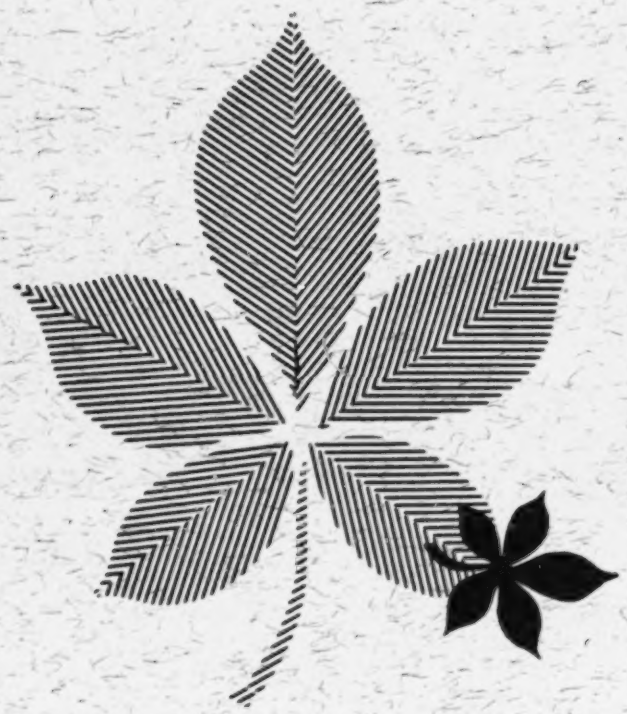
This bibliography of the school plant field which includes text books and periodicals, is organized into sections covering district surveys, enrollments, evaluations, educational planning, room needs and room specifications. Most entries are briefly described. (NI)

SCHOOL PLANT PLANNING

AN ANNOTATED BIBLIOGRAPHY



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ED025138

Educational Administration and Facilities Unit
College of Education
The Ohio State University
Columbus, Ohio
1968

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I. General References

A. Basic Text

National Council on Schoolhouse Construction. Guide for Planning School Plants. 1964 edition. East Lansing, Michigan: The Council, 1964.

A basic reference on school plant planning and construction, this book is designed to serve as a guide for applying criteria, standards, or principles of planning for effective school plants in given situations and under certain conditions or restrictions. Emphasis is placed on the relationship between educational plants and educational programs and upon the significance of balanced conditioning of the various aspects of space. Attention is drawn to the interrelationships between initial building costs, subsequent maintenance costs, materials of construction, structural systems, and the size and design of instructional spaces. The need for research in plant planning and construction is indicated.

B. Other General References

1. American Association of School Administrators. Schools For America, Washington, D.C., The Association, 1967.

The whole process of urbanization has cast school building problems into a new perspective. As people in increasing numbers have moved from sparsely settled areas toward large centers of population, schools have inevitably become larger, and school planners are challenged to create an environment in which the pupil can maintain his individuality and to establish circumstances in which the unique qualities of his personality and his special interests can be recognized and nurtured. This publication attempts to provide new information, new insights, and new guidelines that will lead to school plants which will maximize the kind of environment described above.

2. American Association of School Administrators. Planning America's School Buildings. Washington: The Association, 1960.

This book is a general text designed to aid in planning and building schoolhouses. The usual topics are discussed. Emphasis is placed upon educational needs, the content of the curriculum, and instructional methods as they are related to the beliefs and life activities of people.

3. Boles, Harold W. Step by Step to Better School Facilities. New York: Holt, Rinehart, and Winston, 1965.

   A text designed primarily for university classes in school plant planning, this book presents the steps and planning principles for planning and constructing a school building. Parts III and IV are the major departure from standard text content. In Part III the author discusses planning for 5 specific factors. In Part IV he discusses the perennial question of whether to modernize or build new plants.

4. Building Research Institute. School Building Research. Washington: The Institute, 1963.

   This publication is the report of a program held as part of the Building Research Institute 1962 Fall Conference. Topics considered are:

   1. Definition of School Building Needs
   2. Developing the Strategy for Meeting Future School Building Needs
   3. Comprehensive Campus Planning: Case Studies of Design For Long-Range Planning
   4. Recent Research For School Facility Design, Equipment, and Services
   5. Recent Research in the Management and Operation of School Facilities
   6. Conference Summary: Needs for Further Research

5. Bursch, C.W., and Reid, J.L. High Schools, Today and Tomorrow, New York: Reinhold Publishing Co., 1957.

   In this book the authors have attempted to formulate a new solution to the problem of developing a sound, workable high school program and to design the building to house it. The educational program described is designed to fit the student's individual work schedule to his rate of work in order to allow each student to work to capacity. This program is to be implemented by use of the pupil work station described in the text. Architectural plans and perspective sketches provide graphic illustration of the principles espoused.

6. Caudill, William. Toward Better School Design. New York: F. W. Dodge Corp., 1954.

   A case study analysis as a means for explaining the approach to educational architecture constitutes the format of this book. The author contends that the most complex school building problem can be broken down into separate and relatively simple

and soluble problems. Problems selected 1) suggest the variety of situations in which the recommended approach has been used, 2) offer substantiating evidence for assertions made in the text, and 3) supplement the author's experience by calling on experiences of other architects and educators.

7. Conrad, M.J. and Griffith, William. "Organizational Character of Education: Facility Planning and Business Management," Review of Educational Research, 34:470-484, October, 1964.

   This article is one of seven which constitutes the October 1964 issue in which the literature for the 3 year period from October 1961 to October 1964 dealing with educational organization, administration, and finance was reviewed. Topics covered here deal with facility planning and business management. Sub-topics are: educational planning, environmental controls, school and class size, school construction cost accounting and cost analysis, personnel, and service operations. For references to the literature of this period one may wish to refer to this article. An extensive bibliography is provided.

8. Educational Facilities Laboratories. The Cost of a Schoolhouse. New York: The Laboratories, 1960.

   A report designed to assist school board members in coming to a better understanding about some of the elements of school building costs and to help them ask the kinds of questions which may make it possible to secure more efficient buildings.

9. Engelhardt, H.L., Engelhardt, H.L., Jr., and Leggett, Stanton. School Planning and Building Handbook. New York: F.W. Dodge Corp., 1956.

   A general handbook offering systematic guidance through the many specialized steps involved in planning and constructing school buildings. The use of an outline format and presentation of numerous illustrations of typical documents involved in the building process enhances this rather unique presentation.

10. Handler, Benjamin. Economic Planning for Better Schools. Ann Arbor: University of Michigan, 1960.

    This reference is a study which develops concepts and techniques suitable to an integrated approach to school building problems of the immediate and foreseeable future. It treats revenue, costs, financing, educational needs, obsolescence, location, and design as inseparable parts of a mutually interlocking network of factors to be considered in schoolhouse planning and construction.

11. Herrick, John H., and Others. From School Program to School Plant : A Discussion of Problems of Planning School Buildings. New York: Henry Holt and Co., 1956.

This work is a general text designed to give graduate students in educational administration, practicing school administrators, and school-plant consultants: 1) a basic understanding of the goals to be achieved and of the problems to be encountered in school plant planning, 2) an appreciation of the role that architects and other designers play, and 3) a basis upon which they can reach decisions and give approvals as required.

12. Leu, Donald J. Planning Educational Facilities. New York: The Center for Applied Research in Education, Inc., 1965.

The author's analysis of emerging curriculum changes and their direct effect on school buildings is excellent. The substantial portions of the book directed to the specifics of planning, to discussion of obsolete school buildings, to estimation of future enrollment, to the development of educational specifications, to selection of the school architect, and to the financing of building programs, provide valuable aids to those involved in planning school buildings.

13. MacConnell, James D. Planning for School Buildings. Englewood Cliffs, N.J.: Prentice-Hall, Inc., 1957.

The author in this book discusses: 1) school planning problems and their solution, 2) the skilled and lay personnel involved in the planning, 3) timing of the planning, 4) organizational patterns of programming, and 5) economies in school construction. He concerns himself with the techniques and procedures for organizing lay, educational and technical teams to be involved in planning and building school plants.

14. McQuade, Walter, Schoolhouse. New York: Simon and Schuster, 1958.

Profusely illustrated with pictures, this reference work presents a body of professional opinion intended to help the layman find answers to problems faced in schoolhouse planning and construction. It can be used "as a vocabulary list for talking with" architects, educators and contractors.

15. National Council on Schoolhouse Construction (Now Council of Educational Facility Planners). Planning Facilities for Higher Education. Nashville: The Council, 1960.

The principles of plant planning developed by the National Council on Schoolhouse Construction over the past several decades

have been found to be applicable to facility planning at all educational levels. This report applies those principles to the planning of higher education facilities. It is composed, in so far as is possible, of the opinions of a large number of specialists and represents the consensus of all the members of the Council who have indicated concern with college planning.

16. _____. Proceedings of Annual Meetings. 1930--Present. Available from Council of Educational Facility Planners, 29 West Woodruff Ave., Columbus, Ohio 43210.

These proceedings contain a great variety of topics on school plant planning discussed at annual meetings of the Council.

17. Perkins, Lawrence B., and Cocking, Walter D. Schools. New York: Reinhold Publishing Co., 1949.

A text containing the standard discussions about schoolhouse planning and construction, this book reflects the attitudes of the authors and the thinking of the time when the book was written. Widely supplied with pictures, this book though somewhat out of date, presents the basic considerations of the topic in a lucid and erudite manner.

18. Riker, Harold C. Planning Functional College Housing. New York; Bureau of Publications, Teachers College, 1956.

Based on an investigation of the various elements involved in planning for student housing, this study involves both theory and practices. It presents ideas for the stimulation of deeper thinking, builds a framework for the support of better planning, and develops a point of view toward student housing which holds that the planning and use of student housing on the college or university campus should have an educational basis.

19. Strevell, Wallace H., and Burke, Arvid J. Administration of the School Building Program. New York: McGraw-Hill, 1959.

Responsibility for school-plant programming rests largely with local school authorities. This book emphasizes how the school administrator can locate needed technical information, how he can utilize specialists wisely, and how he should weigh their contributions in terms of all relevant factors to arrive at sound decisions. The three parts of the book deal respectively with: 1) policy decisions, 2) program recommendations and 3) project administration.

20. Sumption, Merle R., and Landes, Jack L. Planning Functional School Buildings, New York: Harper and Brothers, 1957.

This work is a combination of high-minded educational philosophy with specialized and technical material expressed in readable, clear, and forceful language. The illustrative materials provide realism for this text. It was drawn from actual community situations in which professional educators and laymen together have looked ahead with respect to school housing needs, and have carried out school building programs which provide the number and kind of school plant facilities that are so important toward the development of American youth.

II. Periodicals Frequently Containing Articles Pertinent to the School Plant Field

1. American School Board Journal
2. American School and University
3. Architectural Forum
4. Architectural Record
5. Nation's Schools
6. School Management

III. Overview of the School Plant Field

1. Guide for Planning School Plants, Chapters 1 and 2.
2. Planning Educational Facilities, Chapters 1 and 6.
3. Schools For America, Chapters 1-5.
4. Conrad, M.J. Four Steps to New Schools. Columbus: The Ohio State University and Ohio School Boards Association, 1962.

This booklet presents in concise and graphic fashion the fundamental processes involved in planning and constructing school facilities. It is an ideal starting point for the inexperienced school planner and for board members who wish a logical and orderly approach to the problem of such planning.

5. Cornell, Francis G. "Plant and Equipment," Encyclopedia of Educational Research. Edited by Chester W. Harris. New York: The MacMillan Co., 1960. pp. 1008-1031.

   The plant and equipment section of this encyclopedia deals with the school facilities field. Its historical development of the school housing picture and its extensive bibliographical references make this selection of great value for one doing a literature search in this field. A bibliography of 170 references is included.

6. Engelhardt, N.L., Sr. "Flow Charts of School Building Planning." American School and University, 1954-55, pp. 117-120.

   This article presents a discussion of various means of organizing for building and program planning. Four illustrated flow charts or diagrams of this organizational process are helpful. The list of 15 stages through which a building project usually passes is excellent.

IV. Districtwide Building Survey

A. The Survey

1. Guide For Planning School Plants, pp. 6-14

2. Planning America's School Buildings, Chapter 7

3. Planning Educational Facilities, Chapter 2

4. American Association of School Administrators. Management Surveys for Schools: Their Uses and Abuses. Washington: The Association, 1964.

   This report furnishes a background against which sound decisions can be made as to the necessity for management surveys and under what conditions they may be helpful in a particular school district. The sections dealing with "When is a Survey Useful?" and "Where to Get Help" will be valuable to boards of education and superintendents.

5. Engelhardt, N.L. and Boyd, J.B. "How to Determine Attendance Area Boundaries," Nation's Schools. 79:63-4. May, 1967.

   Ten factors which should be given first consideration when determining where to set school attendance boundaries are

identified in this article. A check list to help in this process of boundary selection is provided.

6. Leu, Donald J., and Forbes, John F. What is Involved in Conducting a School Plant Survey. Professional Series Bulletin, No. 9. East Lansing: Bureau of Research and Service, Michigan State University, 1956.

   A guide for improving public school facilities, this publication is designed to help school districts identify some of the means by which they can develop satisfactory long-term school building programs.

7. Liebeskind, M. "Critical Path Method in School Building Design," American School and University, 37:36-7, February 1965.

   The Critical Path Method is a management tool that gives the administrator a view of all the steps in the design and construction of an educational building. Perhaps the most solid benefit of the Critical Path Method is that it speeds up the planning process.

8. Roaden, O.P. "Surveys: Valuable Tool For Planners," American School and University, 37:23-5, May 1965.

   The survey provides a basis for diagnosis, but not the cure. Three basic types of surveys are identified. These are: educational, plant and facilities, and comprehensive.

9. Sumption, Merle R. How to Conduct a Citizen's School Survey. New York: Prentice-Hall, Inc., 1953.

   This book provides a step-by-step outline for organizing citizens for work, collecting necessary information, interpreting information in the light of the local situation, and developing a long-range educational plan. In essence, it shows how a community can organize and conduct a school survey which will give the board of education a long-range plan for meeting the educational needs of the community.

10. Typical survey reports, The Ohio State University, College of Education, Educational Administration and Facilities Unit.

B. Determining The Educational Program

1. Guide for Planning School Plants, pp. 2-3.

2. Planning America's School Buildings, Chapter 7.

3. Planning Educational Facilities, Chapter 3.

4. Conrad, M.J. and Wohlers, A.E. "Cooperation Plus -- The Road to Better Schools," Ohio School Boards Journal, 5:18-19, March 1961.

_____. "School Plants for Tomorrow's Schools," Ohio School Boards Journal, 5:13, 18, May 1961.

_____. "School Plants for Tomorrow's Curriculum," Ohio School Boards Journal, 5:15-17, April 1961.

These 3 articles report some of the procedures and findings of The Associated Schools Project sponsored by the School Plant Division of the Bureau of Educational Research and Service, Ohio State University. This project was designed to determine whether or not the British consortium, long used in business could be effectively used in planning new school buildings. It was hoped that a loose association of school districts, meeting with outstanding specialists on curriculum and the school program, could find independent solutions to common problems and effect certain building economies.

5. Green, Alan C. (ed.) Educational Facilities With New Media. Washington, D.C., Department of Audio-visual Instruction, National Education Association, 1966.

To make maximum use of the innovative developments in the field of audio-visual media, special considerations must be made in the facilities which will house their use. This book is an excellent source for ideas in this area.

6. Mills, G.E. "The How and The Why of The 'Middle' Schools," Educational Forum, 24:389-395, May 1960.

Based on observations of 320 physical, mental, emotional, and social growth characteristics and their teaching implications for boys and girls, conclusions were drawn that youngsters in K-4, in 5-8, and in 9-12, had greatest similarities of growth patterns. This led to the establishing of primary schools (K-4) devoted to the development of basic skills and the extension of interests and appreciations; of middle schools (5-8) concerned with the development of basic skills, but also with the goal that students become increasingly self-directing; and of high schools (9-12) which are typically oriented toward college entrance. Physical facilities and equipment as well as program are to be tailored for particular grade levels.

7. Perry, Arnold. "Teaching by Television in Today's Schools," Educational Forum, 24:389-395, May 1960.

   The use of TV in schools is rapidly increasing and a number of experimental programs are planned or underway. Designing, producing, and scheduling of programs requires a "team approach" to curriculum determination and methods of teaching. How these concepts affect schools, the pros and cons of teaching by TV and the results of research on the effectiveness of TV instruction are adequately presented by the author.

C. Enrollments

1. Guide for Planning School Plants, pp. 7-10.

2. Planning America's School Buildings, Chapter 7.

3. Planning Educational Facilities, pp. 19-24.

4. Planning Functional School Buildings, Chapter 6.

5. Brown, Roscoe, Jr. Predicting School Enrollments, New York: School of Education, New York University, 1961.

   This monograph has been prepared to assist school personnel to more accurately predict future school enrollments. A discussion is presented of 3 projection techniques and a step-by-step method is offered for computing a school enrollment projection. The importance of a good school census is emphasized.

6. Engelhardt, N.L. "Impact of Population Trends on Long-range Planning," American School and University, 1953-54. pp. 149-152.

   Dr. Engelhardt presents statistics based on data available to him in 1953 about population trends which affect school enrollments and discusses some of the implications such statistics have for long-range school facility planning.

7. Gottlieb, Abe. "A Planning Approach to School Enrollment Forecasts," American School Board Journal, 128:68-69, February, 1954.

   In guiding urban areas toward optimum development, a most important activity is planning for desirable school locations and for adequate classroom space. The preparation of a school building program should include a thorough analysis of school needs, not the least of which involves enrollment projection.

The author provides a discussion of background factors, of planning factors, and of changes to be anticipated.

8. Griffith, William J. "Variables Affecting Public School Enrollment Change." Unpublished Ph.D. dissertation, The Ohio State University, 1964.

   An analysis of 25 factors which affect school enrollments with particular attention to some of the socio-economic factors identified by Jonassen. Dr. Griffith concludes that school districts and municipalities need to improve their programs for population data collection.

9. Herrick, John H. "Estimating Future School Enrollments in Rapidly Growing Communities," Educational Research Bulletin, 32:92-94, 111, 112, April 16, 1952.

   Dr. Herrick describes 2 cases in which ordinary methods for estimating future school enrollments would be impractical. The development of ranges in enrollment gives educational planners a look at possible enrollment patterns and allows them to develop contingent plans. In a like manner, the use of saturation procedures for estimating long-range enrollment coupled with the usual survival rate technique for estimating short-range enrollment, allows school plant planners to provide for immediate action recommendations consistent with the long-range picture.

10. Larson, Knute G., and Strevell, Wallace H. "How Reliable are School Enrollment Forecasts?" School Executive, 71:65-68.

    Even though enrollment forecasts have not proved highly reliable, particularly when considering the high projection, a necessity remains in a school district to consider future enrollment when involved in planning school plant construction. Forecasters are in extensive agreement that some basis of total population estimate should be a basic consideration in enrollment forecasting.

11. Strevell, Wallace H. "Techniques of Estimating Future Enrollment" American School Board Journal, 124:35-38, March, 1952.

    Four practical methods which school personnel may use to project future enrollments and to determine the space needs of school buildings are discussed. These methods are: 1) census class projection, 2) retention ratio projection, 3) housing projection, and 4) population forecasts. The author cautions, however, that blind use of any technique can be, at the very least, misleading. "Prudential planning," he says, "necessitates annual review of the trend projections."

12. School enrollment chapter of typical survey reports, The Ohio State University, College of Education, Educational Administration and Facilities Unit.

D. Plant Evaluation

1. Guide for Planning School Plants, pp. 11-13.

2. Planning Educational Facilities, pp. 24-28.

3. Conrad, M.J. A Manual for Determining the Operating Capacity of Secondary School Buildings. Columbus: Bureau of Educational Research and Service, The Ohio State University, 1954.

   This short manual explains the Conrad formula for determining operating capacities of school buildings and provides examples of suggested forms for collecting the necessary data.

4. _____. "A Technique for Determining the Operating Capacity of Secondary School Buildings." Unpublished Ph.D. dissertation, The Ohio State University, 1952.

   This dissertation provides the historical and theoretical background for the Conrad formula for determining operating capacities of school buildings. The discussion of the methods used by other authors and by those on which the formulation is based will be of interest to those wishing a view of this aspect of the school plant field. The uniqueness of the Conrad formula derives from the fact that all program factors are considered in its use.

5. Conrad, M.J., and Smith, Clifford. "School Plant Evaluator-Profile." Columbus: The Ohio State University, 1962. (Mimeographed).

   This is an instrument based upon educational program elements, for evaluating school buildings.

6. George, N.L. "How to Evaluate Quality," American School Board Journal, 138:29-31, January, 1959.

   The major elements in school plant planning and construction necessary for quality determination include:

   1. Adequate long-range educational planning
   2. Appropriate facilities
   3. Architectural creation of planning
   4. Choice of basic building materials and the processes of construction

5. Craftsmanship of the builders
6. Material durability and adaption to local climate conditions
7. Attractiveness

A 2-page checklist of quality levels is included.

7. Landes, Jack L., and Sumption, Merle R. Citizens' Workbook for Evaluating School Buildings. New York: Harper and Brothers, 1957.

This manual is, in fact, a workbook for citizens who wish to appraise their school buildings in terms of how well they fulfill the housing needs of education in the community. The essential functional characteristics of a school building are defined, directions for scoring are provided and questions on each characteristic are set forth and accompanied by suggested criteria for rating.

8. The Nation's Schools. "How Award Winning Schools Compare," The Nation's Schools, 75:45-78, January, 1965.

A special report, largely in chart form, delineating detailed descriptions of 12 high schools, 7 junior high schools, and 12 elementary schools. Each of these schools has won a 1964 citation for excellence of design from either the American Association of School Administrators or a chapter of the American Institute of Architects. Included are pictures, plans, and commentary, as well as construction data.

9. School plant chapter of typical survey reports, The Ohio State University, College of Education, Educational Administration and Facilities Unit.

E. Financial

1. Guide For Planning School Plants, p. 13.

2. Planning Educational Facilities, Chapter 5.

3. Schools For America, Chapters 16 and 17.

4. Castetter, W.B. "Suggestions for Planning School Bond Issues," American School and University, 1949, pp. 59-63.

The suggestions advanced for planning school bond issues include: 1) costs and methods of financing, 2) need for long-term planning, 3) coordinating educational and financial planning, 4) legal service, 5) community support, 6) timing the sale, 7) marketing schedules,

8) service of school bond issues, and 9) bond records. While examples are somewhat dated the general content of the article is still timely. A 26 item bibliography is included.

5. Dodge, William R. "Major Legal Problems and Procedures in the Area of School Finance and Business Management." Unpublished Master's thesis, The Ohio State University, 1952.

   This thesis is an attempt to select the major legal problems in the area of school finance and school business management and to cite the appropriate statutes and their interpretation. Chapter III deals with financing the school building program and discusses two methods of financing available to Ohio Boards of Education.

6. Furno, Orlando F. "The Cost of Borrowing Money," School Management, 8:89-91, July 1964.

   Interest rates paid to borrow money for schoolhouse construction vary widely from district to district. Factors affecting this difference are: 1) the credit rating of the district, 2) the state of the bond market as a whole, 3) the time required to repay the loan, 4) the amount to be borrowed, and 5) the time at which the money is borrowed. The author suggests that the factor a school district can control best is the credit rating (as represented by the "Moody rating") earned by the school district. A chart explaining Moody ratings is included.

7. McCann, Lloyd E. "On the Indebtedness of School Districts," American School Board Journal, 147:9-10, September, 1963.

   The author discusses 3 methods by which school districts may escape debt limitations in meeting the demands of school building construction. These 3 methods are seen as the "pay-as-you-use" or lease-purchase plan, the use of tax anticipation instruments, and the "pay-as-you-go" plan. While the author describes these three possibilities, he cautions that, "eventually the economic costs of providing schools have to be paid" and states that the present pattern of debt limitations may require school districts to pay premium prices for what they get.

8. Morphet, Edgar L., and Corbally, John E., Jr. "How Shall We Finance New School Buildings?" American School and University, Vol. 1, 1956-57, pp. 173-182.

   "The problem of financing new school buildings in this country has not yet been solved satisfactorily in many areas but it

can be solved if the American people cooperate in agreeing on a desirable program and in putting it into operation without any more unnecessary delays." The authors delineate general and financial considerations recognized as highly desirable by many authorities in the field and describe present state provisions.

9. Stollars, Dewey H. "Selected Factors Affecting Marketability of School Bonds in Ohio." Unpublished Ph.D. dissertation, The Ohio State University, 1963.

   Dr. Stollars has identified factors which affect the successful sale or marketability of school bonds. For Ohio, he has also identified hindrances to successful bond sales. He concludes that there are means of improving bond marketing in Ohio and offers suggestions for improving the technical skills of school administrators and the relationships involved in the sale of school bonds.

10. Finance chapter of typical survey reports, The Ohio State University, College of Education, Educational Administration and Facilities Unit.

11. See state laws pertaining to state capital assistance plans and U. S. Public Law 815.

F. Recommendations

1. Guide For Planning School Plants, pp. 13-14.

2. Planning Educational Facilities pp. 28-33.

3. Griffith, William J. "Consider Total School Housing Plan," The American School Board Journal, 152, #6:10-11, June 1966.

   Dr. Griffith conceptualizes the process of school planning as a cone shaped model in which the altitude of the cone represents time and the other dimensions represent change in enrollment and program. The apex of the cone represents the present in terms of pupil population, educational program, and time. The base represents the long-range plan. The slant height of the cone is dotted for a portion of its length to indicate that the time for the long-range plan cannot be fixed. Other aspects of the model represent the short-range plan and the immediate action plan.

4. Recommendations section of typical survey reports, The Ohio State University, College of Education, Educational Administration and Facilities Unit.

V. Educational Planning

A. Organizing for Educational Planning

1. From School Program to School Plant, Chapter 6.

2. Engelhardt, N.L., Jr. "Time Required to Plan and Construct A School Building," American School Board Journal, 150:25-6, January 1965.

   This article provides a listing of the stages of planning and construction as they affect the time of completion of a school building.

3. Gilliland, J.W. and Roaden, O.P. "Life Begins At Forty For Buildings," American School and University, 37:21-3, August 1965.

   A delineation of the role of educational planning and specifications in relation to modernization of existing plants and how the school personnel of Louisville implemented this process.

4. Lyman, William. "Taking the Mystery Out of Educational Specifications Writing," American School Board Journal, 145:25-26, September 1962.

   "A set of educational specifications for a new school is basically a detailed description of all the activities that will take place in the building." Other items to be included are the educational philosophy and objectives, the desired general architectural characteristics, and a preliminary budget covering building construction equipment and furniture, site development and fees. The author presents a questionnaire to be used by school boards when writing educational specifications.

5. Parker, Floyd G., and Featherstone, Richard L. "How to Specify Educational Needs for a New School." The Nation's Schools, 73:49-54, January 1964.

   An effective set of educational specifications will tell the architect what he needs to know about the educational program - present and future - which will be housed in the structure he has been hired to design. This article lists what these specifications should include, how to collect facts on which

to base these specifications, what questions to ask to determine specific facility and equipment requirements of the school program, and how to finally produce the specifications.

6. U. S. Department of Health, Education and Welfare, Office of Education. Planning Schools for New Media. Prepared by Amo DeBernardis and Others. Washington: U.S. Government Printing Office, 1962.

   This is a reference guide which presents information for planning school buildings so that teachers may make full and effective use of modern media of instruction. The format of this guide is enhanced by the liberal use of illustrations and pictures.

7. Wilson, Russell E. "Educational Specifications," The Nation's Schools, 56:71-4, October 1955.

   In planning school plants the educator must develop educational specifications which tell how a building is to operate; that is, he must describe process and activities, and people and what they will do. The architect develops construction plans and specifications which tell how the building will look; that is, he describes physical materials and measurements. The planning of the educator must precede that of the architect; educators must first clarify philosophical concerns and educational purposes.

8. Wohlers, A.E. "A Manual for Planning a Secondary School Building." Pamphlet A-1. Columbus: Bureau of Educational Research and Service, The Ohio State University, 1954, (Mimeographed).

   In the cited work, the section entitled "Purpose of the Manual" gives the reader a brief but comprehensive statement of the process involved in planning school buildings and indicates the personnel who should be involved in such planning. Descriptions and titles of the other pamphlets in the series are included.

B. Establish Details of Program

   1. From School Program to School Plant, Chapters 6 and 11.

   2. Planning America's School Buildings, Chapters 3, 4, and 5.

3. Anderson, Robert H., and Mitchell, Donald P. "Team Teaching, New Learning Concepts Demand Changes in School Plant Design," The Nation's Schools, 65:75-82, June 1960.

Architectural implications of team teaching and other new learning concepts collectively indicate that space requirements in future schools will differ greatly from conventional space requirements. The authors indicate that planned flexibility is a must although they recognize that "flexibility is not always an unmixed blessing." Three levels of flexibility are identified. These are: instantaneous flexibility (as represented by operable walls), "week-end" flexibility (as represented by movable partitions), and "over-the-summer" flexibility. (as represented by non-load bearing walls, etc.)

4. Bureau of Educational Research and Service, The Ohio State University. A Manual For Planning an Elementary School Building. (Mimeographed).

A manual following the format of those developed by A.E. Wohlers which is designed to assist teachers and other personnel involved in the planning of an elementary school building. This manual helps teachers and other personnel to collect and correlate their thoughts, ideas, and desires and to state them in terms which will be of use to an architect in drawing working plans and specifications for the desired building.

5. Clapp, Wilford F. "Cooperative Planning of School Plants," American School and University, 1952-53, pp. 161-164.

The author sees two distinct phases in planning school buildings: planning for buildings and planning of buildings. He suggests that in both phases cooperative planning can and should be used. He advances three reasons why democratic, cooperative planning is desirable. These are, briefly: 1) a belief in democratic school administration, 2) a belief in the human relations effects of cooperative planning, and 3) a belief that cooperative planning will result in a better building program and in better individual buildings.

6. Colbert, C.R. "Perception Core School," The Nation's Schools, 65:79-84, March 1960.

The author attempts to design a facility which will accommodate new learning-teaching concepts. A tri-departmental building organization surrounding a "large plaza which provides for the interaction of recreation, dedication, accomplishment, example, unusual interest, and pride" (the Perception Center), and a

vertically related central library express the author's conception of facilities needed to accomplish this accommodation.

7. Holmes, G.W. "Plan the School for the Program," School Executive, 73:19-21, March 1954.

   If a school building is to do more than provide seating and shelter for children, if it is to be an educational tool, it must be planned and designed accordingly. Classroom design to a great extent shapes the program of education offered in a community. The author urges careful and thorough educational planning in school districts where a building program is in progress.

8. Knezevich, S.J. "Curriculum and the School Plant," Educational Leadership, 10:495-503, May 1953.

   The school plant, this author suggests, is "the physical expression of the educational philosophy of the community." Building a more functional school plant necessitates more active participation on the part of curriculum workers during school plant planning periods.

9. The Work Conference in Curriculum, Instruction, and Administration, The University of Denver Building Design, The Challenge of Technology in Planning for Education. Denver: School of Education, University of Denver, 1961. pp. 42-59.

   In this report the committee for building design stresses the need for planning for technological change in education and makes some suggestion for adaptation of school plants for the ever changing educational picture.

10. van Nuys, Jan C. "What an Architect Expects From the School Administration," American School and University, 1947-48, pp. 57-59.

    This architect sees himself as part of the team for school planning, and the school administrators as the liaison between the board of education and the architect. He sees the administrator as responsible for the accumulation of "educational" administration in the form of surveys and data about his community's problems and needs, and for the interpretation of this information to the architect so that they may come to an understanding on how the community's philosophy of education is to be translated into architectural design.

11. Wiltse, E.W. "Before the Architect Begins," American School Board Journal, 130:33-34, January 1955.

    Educational planning of a new school plant should embody the cooperative thinking of many people. Included in this list are:

    1. Members of the board of education
    2. School executives
    3. School teaching staff
    4. School custodians
    5. Students
    6. A "host of taxpaying citizens."

    The author describes how one district involved the above groups and describes Caudills' 6 salient considerations on which they based their deliberations.

12. Wohlers, A.E. "A Manual for Planning A Secondary School Building," Columbus: Educational Administration and Facilities Unit, The Ohio State University, 1954. (Mimeographed)

    This 23 series manual is designed to help teachers and other planning personnel establish the details of their program for plant planning purposes.

C. Calculate Room Needs

1. From School Program to School Plant, pp. 112-126 and pp, 276-375.

2. Castaldi, Basil. The Castaldi Nomogram. Cambridge, Massachusetts: New England School Development Council, 1953.

   The Castaldi Nomogram is a tool or an aid for translating any specific educational program or curriculum into physical space requirements in a proposed secondary building. It consists of 3 specially designed charts for determining the number of teaching stations required to house any given enrollment of pupils in any subject, if the number of teaching periods per week in the school program and the proposed class size and the number of periods each pupil attends that subject per week are known. The Castaldi Nomogram is based on the following equation:

   $T = 1.25 \frac{E}{c} \cdot \frac{n}{N}$ where,

   T = teaching stations

   1.25 - the factor related to a pupil station utilization of 80%

E = enrollment in any subject

n = number of times per week subject is attended per pupil

N = total number of teaching periods per week in the educational program, and

c = proposed class size.

3. Conrad, M.J. A Manual for Determining The Operating Capacity of Secondary School Buildings. Columbus: Educational Administration and Facilities Unit, The Ohio State University, 1954.

4. _____. "A Technique for Determining the Operating Capacity of Secondary School Buildings." Unpublished Ph.D. dissertation, The Ohio State University, pp. 158-162.

5. Holy, T.C., and Herrick, John H. "School Plant," Encyclopedia of Educational Research. Revised edition. Edited by Walter S. Monroe. New York: MacMillan Co. 1950, pp. 1099-1103.

   This article covers 15 aspects of school plant. The section concerning techniques for determining housing requirements presents a brief discussion of housing requirements for the elementary school and an outline of three major studies (those by Anderson, Packer, and Wilson) dealing with methods for determining the housing requirements for a given secondary school educational program.

6. Wohlers, A.E. "A Manual for Planning a Secondary School Building." Pamphlets B-1 and B-2. Columbus: Educational Administration and Facilities Unit, The Ohio State University, 1954 (Mimeographed).

D. Develop Specifications for Regular Classroom Areas

1. From School Program to School Plant, Chapter 13.

2. Guide for Planning School Plants. pp. 32-36.

3. Planning America's School Buildings, Chapters 3, 4, and 5.

4. Berson, M.P. and W.W. Chase. "Planning Preschool Facilities" American Educator 2:7-11 December 1965.

   This article describes various considerations which affect the design and construction of areas for preschool children. The authors develop a reasonable method for local planning of these facilities and describe requirements for out-of-door as well as in-door facilities and equipment.

5. Harris, J.W., Editor. "Getting Away from the Rectangular Classrooms," School Management, 4:60-66, July 1960.

The rectangular classroom is not necessarily the best shape for classrooms. In fact, it may be a deterrent for some kinds of activities. It has been suggested that we think in terms of differently shaped rooms for different forms of learning.

6. MacConnell, James D., and Ovard, Glen F. "On Planning Academic Classrooms," American School Board Journal, 144:34-38, February 1962.

This article outlines general procedures for planning academic classrooms and points out that it is vital that these facilities be planned according to the functions that are to be performed in them. The authors discuss who should do the planning and identify the techniques of good planning.

7. National Council on Schoolhouse Construction. Elementary School Plant Planning. Nashville: Special Committee on Elementary School Plant, 1958.

This pamphlet is a thorough and comprehensive treatment of the factors which are to be treated in planning an elementary school plant. The 2-page list of references for elementary school planners included at the end is a good source of materials which were published prior to the 1958 publication date of this work.

8. _____. Secondary School Plant Planning. Nashville: The Council, 1957. pp. 22-51.

This pamphlet is a thorough and comprehensive treatment of the factors which are to be treated in planning a secondary school plant. The 2-page list of references for secondary school planners included at the end is a good source of materials which were published prior to the 1957 publication date of this work.

9. Ovard, Glen F. "It's Time to Plan Academic Classrooms," American School Board Journal, 144:26-27, January 1962.

The first in a series of articles on planning classrooms for the academic areas of the modern secondary school. The author cites 5 reasons for the necessity for adequate planning in academic areas. These are:

1. The academic subjects are the basic framework for the existence of schools

2. The demands of present world problems for topics engendered in the academic areas
3. That reducing the effectiveness of the basic educational program is false economy
4. The physical facilities of a classroom should aid in carrying out teaching and learning activities
5. Teachers are trained to use new findings in psychology and technology - one must facilitate use of this training

10. Wilson, Russell E. Flexible Classrooms. Detroit: The Carter Company, 1953.

    This pamphlet deals with the planning and furnishing of the classroom so that change is possible and encouraged. The author shows how this can be accomplished by use of "flexible" furniture, movable cabinets and equipment, adaptable wall fixtures, and imaginative room design. Pictures and illustrations are well used to demonstrate the author's ideas.

11. Typical educational specifications report, The Ohio State University, College of Education, Educational Administration and Facilities Unit.

E. Develop Specifications for Special Areas

a. General References

1. From School Program to School Plant, Chapters 14-18.

2. Guide for Planning School Plants, pp. 36-74.

3. Planning America's School Buildings, Chapters 3, 4, and 5.

4. Educational Administration and Facilities Unit, The Ohio State University. A Manual for Planning an Elementary School Building. (Mimeographed)

5. Educational Facilities Laboratories. Design for ETV: Planning for Schools with Television. New York: The Laboratories, 1960.

   The primary focus of this study is the design of a facility for the educational program; that is, spaces and equipment for learning in the school. Particular emphasis is placed on the effective use of television in the classroom. Here one would expect to find discussions of the equipment necessary for an educational television program, but also one can find discussions and illustrations of other building and equipment factors such as space dividers, a teachers' center, flexible

furniture, and design for various sized group spaces. The glossary of ETV terminology and the list of references and sources is quite useful.

6. Educational Facilities Laboratories. Schools for Team Teaching. New York: The Laboratories, 1961.

   This report presents representative examples of recent and planned elementary and junior high schools designed to house team teaching programs. The pictures, illustrations, and floor plans presented are particularly helpful in depicting how school facilities can be planned and constructed to accommodate this specialized teaching technique.

7. Wohlers, A.E. "A Manual for Planning a Secondary School Building." Columbus: Bureau of Educational Research and Service, The Ohio State University, 1954. (Mimeographed)

   The entire manual consists of 23 pamphlets. Pamphlets A-1, B-1, B-2, and C-1 are explanatory and provide directions for use of the others. Pamphlets C-2 through C-19 provide materials in the various subject and building service areas which assist the school staff in planning for the facilities desired in a new school plant.

8. Typical educational specifications for new schools, The Ohio State University, College of Education, Educational Administration and Facilities Unit.

b. Art

1. "Art Rooms and Equipment," Bulletin of the National Association of Secondary School Principals, 45:62-81.

   The authors here offer a discussion of some of the basic physical requirements for an adequate art program. An eleven point outline is followed. These eleven points are:

   1. Who should be responsible for planning the art room?
   2. What should be included in the educational specifications for art rooms?
   3. What are some trends in planning functional secondary school art rooms?
   4. What are the basic considerations in planning functional secondary-school art rooms?
   5. What is the nature of the all-purpose art room?

6. What equipment is needed in the all-purpose art room?
7. When are special rooms for individual art activities more desirable than all-purpose art rooms? How might these rooms be designed and equipped?
8. What is the cost of art furniture, equipment, and functional storage?
9. What kinds of supplies are needed for a good art education program in the secondary schools?
10. What is an adequate per pupil budget for supplies and tools for art education in junior high school? senior high school?
11. How should art supplies be selected?

2. Taylor, James L., and Others. Space and Facilities for Art Instruction. U. S. Department of Health, Education, and Welfare, Office of Education, Special Publication No. 9. Washington: U. S. Government Printing Office, 1963.

   This is a report of a study in which an attempt was made to identify trends in new and remodeled facilities for art instruction, and to secure pertinent information on new art facilities and suggestions for use in planning these facilities. Illustrations, photographs and floor plans are used to show the reader some of the current ideas for art facilities lay-out.

c. Administration

1. Taylor, James L. Administrative Facilities in School Buildings U. S. Department of Health, Education and Welfare, Office of Education, Special Publication No. 6, Washington: U. S. Government Printing Office, 1957.

   This brochure emphasizes the importance of studying and analyzing administrative functions and activities when planning facilities. Some characteristics of various elements are described and a number of floor plan layouts of administrative facilities are provided. A short annotated bibliography is included.

2. "Why Toronto Put a 'Professional Center' in Its Business Office." The Nation's Schools. 69:70-74, January 1962.

   "The headquarters building of a school system should do more than provide centralized offices for its administrative and business departments." Toronto, Ont., has accomplished this by making their central facility a place where the public can

look for intelligent and informed educational leadership. In this building are facilities which offer the teaching staff opportunity for study, inquiry, research, training, and professional growth. Some of these facilities are: a professional library; an auditorium-conference room (capacity, 250); reception, committee, and waiting rooms; a sound proof studio equipped for radio, television and motion picture production; a reading clinic, and a research department.

d. Auditorium and Stage

1. Brown, R.H. "Maximum Use Planned for New Auditorium." American School Board Journal, 154:54-5, February 1967.

   When it became apparent that the new high school was deficient because no auditorium facilities had been provided, school officials set about to design a structure which would be used by a widely diversified selection of groups on a regular basis.

2. Educational Facilities Laboratories. Divisible Auditoriums New York: The Laboratories, 1966.

   This booklet illustrates numerous approaches to dividing the auditorium for instructional purposes and treats some of the problems connected with dividing such a space.

3. Iron, William A. "The High School Multi-Purpose Theater: A Critical Study," Curriculum Bulletin 17. Eugene: School of Education, University of Oregon, 1961.

   This study combines information about the particular requirements of a theater and the problems of the multi-purpose combination which affect multi-use design. A multi-purpose area for drama is a second choice when compared with a non-classroom area which includes the gamut of facilities vital to dramatic performance. However, with proper planning multi-use facilities can be made acceptable.

3. Miller, James H. "It's Time to Update the School Auditorium and Stage," American School and University, 1959-60 pp. 29-36.

   After a general discussion of the development of stage forms, the author submits a basic plan for a general purpose stage in a large auditorium suitable for secondary school and college programs.

4. Robinson, H.W. "Auditorium and Stage Facilities," Bulletin of the National Association of Secondary School Principals, 33:159-172, December 1949.

   This article describes the typical stage and auditorium forms found in most schools in use today. The treatment offered here is valuable in terms of using stages for productions, but does not include a discussion of the current ideas about use of the auditorium as a large-group space.

e. Cafeterias and Kitchens

1. Davis, Clifford M. "Individual Kitchens vs. Central Kitchens for School Use," American School and University, 1:207-210, 1957-58.

   Mr. Davis advances pro and con arguments for individual kitchens as opposed to central kitchen operation. His bias shows through in this article however, since a stronger case is made against the central kitchen operation than for it.

2. U. S. Department of Agriculture, Agriculture Marketing Service, A Guide for Planning and Equipping School Lunchrooms, P.A. 292. Washington: U. S. Government Printing Office, 1956.

   Adequate facilities are essential to the operation of a good school lunch program. This booklet provides information on location, space, construction features, and equipment for all lunch room areas. General guides, based on meal loads ranging from 100 to 750 lunches per day, are provided. These guides can be adapted to specific local situations and needs.

f. Foreign Language

1. Hutchinson, Joseph C. Modern Foreign Languages in High School: The Language Laboratory, U. S. Department of Health, Education, and Welfare, Office of Education, Bulletin No. 23. Washington: U. S. Government Printing Office, 1961.

   The installation of a language laboratory must be preceded by a reappraisal of the school's foreign language program. Such facilities contribute most when audio-lingual instruction forms the basis for the progressive and continuous development of all the language skills. This bulletin discusses how one may plan and prepare for the use of such facilities.

2. Johnson, Marjorie. "How to Plan a Language Laboratory," The Nation's Schools, 63:102-106, February 1959.

   This article discusses the need for the language laboratory, the use of the language laboratory, supervision in the language laboratory, and the educational values attained through the use of the language laboratory. Pictures of some existing varieties of laboratories and a schematic plan for an ideal laboratory are included.

3. "Language Labs: An Agonizing Reappraisal," Overview, 1:45-49, November 1960.

   The language lab story is an involved one, and bears every sign of becoming more so. It is time to get an overview of the language lab situation. Since "language lab" is a misnomer for what is in reality an electronic learning lab, new ways of looking at its use must be devised in order to preserve a useful teaching device from the apathy of educators and the discouragement of producers.

4. Martland, Theodore H. "Have You Considered Multi-Purpose Language Labs?" School Management, 5:86-90, March 1961.

   Since most students can't profitably spend more than 20 minutes of each class hour doing intensive lab drills, some other uses must be made of these spaces other than electronic teaching. The faculty of one school in Valley Stream, N.Y., report their solution to this dilemma.

g. Health, Physical Education and Recreation

1. "Athletic and Play Areas," American School Board Journal, 150:25-64, February 1965.

   This citation is a collection of articles and advertisements which is in fact a separate "Bookazine" dealing with athletic and play areas. Articles appearing in this section are:

   1. "Playground Aestheticism Part of American Heritage." George T. Wilson
   2. "Designer - Consider Community Needs." Fred Dirhel
   3. "Here's Exemplary Athletic Setup." Robert Tank and Milton Blake
   4. "Hard Turf Problems Softened." Harry Wilcox
   5. "Pavements - Past, Present and Future." K.N. Cundall

6. "What Is Legally Adequate Playground Supervision?" M. Chester Nolte
7. "All The Girls Ask is Space ... To Enjoy Their Sports." Nancy Poe
8. "Determined Music Teacher 'Composes' Physical Education Symphony." Janetta Girotto
9. "Ventilation Guide To Good Environment." Kenneth Beseke
10. "Fundamentals in Selecting Gym Seating." Cecil Ishell
11. "Daylight Saving Some Costly Light Problems."
12. "New Products in the Field."

2. Educational Facilities Laboratories, Air Structures for School Sports. New York: The Laboratories, 1964.

   The nylon "bubble" may provide the answer for enclosing large areas quickly and cheaply. Answers to many questions which arise when one considers air-supported structures are found in this EFL report.

3. Robertson, D.H. "Pools in Schools." National Education Association Journal, 56:41, May 1967.

   "Square foot to square foot, hour to hour, and year to year, no physical education facility can be more fully used than the swimming pool." The author points out eight components of an excellent school swimming and water safety program.

4. Shaver, J.A. "Designing for PhysicalEducation," School Activities 36:7-21, May 1965.

   Plans and rationale for improved gymnasium designs are presented.

4. National Conference on Areas and Facilities for Health, Physical Education and Recreation. Planning Areas and Facilities for Health, Physical Education and Recreation. Bloomington, Indiana. Indiana University, 1965. Rev. Ed.

   The expanding availability of leisure time and the concern over the growth of "spectatoritis" leads one to conclude that more attention should be paid to the areas of health, physical education and recreation. Facilities for a wide range of activities must be provided in today's schools. This conference report indicates some of the pertinent concerns in this area and how to plan facilities to provide for them.

5. The Athletic Institute, Inc. Planning Facilities for Health, Physical Education and Recreation. Chicago: The Institute, Rev. ed. 1965.

   This revised guide provides concrete information and practical suggestions of material value to planners of facilities for athletics, recreation, outdoor education, and physical and health education. It includes many diagrams and sketches showing specific measurements of these areas and facilities and provides a check list for facility planners containing 205 items, a construction progress check list of 40 items, and a punch list for construction jobs. Its 6 page glossary can prove valuable to the planner as an aid to understanding the dialogue of the program specialist.

h. Individual Learning, Team Teaching

1. "Are Study Carrels Practical in Elementary Schools," School Management, 7:55-7, June 1963.

   This article claims study carrels are practical in elementary school if ample resource materials are available, if there is a planned program of independent study, and if study skills are taught. Carrels, when properly used, become the "prestige" learning places and are preferred by youngsters. This article suggests the ways and means by which carrels can be utilized to utmost advantage in elementary schools. Included is a chart, "Seventeen Steps to Independent Study."

2. Brubaker, Charles W., and Perkins, Lawrence B. "Sketch Book--Space for Individual Learning," School Executive, 78:43-58, February 1959.

   Innovative designing for individual learning has led the authors to design 3 kinds of space: individual studies "Q-space," individual teachers' studio, and group spaces of various kinds. Here are illustrated in sketch form these basic components of a school facility designed to stimulate individual learning.

3. Congrieve, Willard J. "Toward Independent Learning," North Central Association Quarterly, 37:298-302, Spring, 1963.

   In schools which contain profuse facilities for independent study such as instructional materials centersand language laboratories, time must be provided for students to use these vast resources. When highly intelligent and motivated student bodies are taught by a genuinely competent faculty, exposure time in a class setting must be reduced so as to allow teachers

to work with small student groups and to counsel with individual students working through special problems. The author reports how The Laboratory Schools of The University of Chicago have met this problem through block programming.

4. Nelson, V.C.R. "Time...Team...Tectonics," California Teachers Association Journal, 61:28-30. October 1965.

   An educational plant of unique design and a spectacular array of electronic teaching aids are features which remove this school a generation or two from the traditional schoolhouse. To complete the triple-threat partnership of flexible scheduling and instruction-oriented architecture, the Lincoln faculty practices a well-adapted brand of team teaching.

i. Home Economics

1. Ericksen, C. Aileen "Adding Variety to Homemaking Programs," American School and University, 1961-62. pp. G-9-18.

   Homemaking education facilities should be functionally organized into a number of centers. These centers should be so arranged and planned as to enhance the teaching of various program units. Some of these units are: 1) care and guidance of children; 2) personal and social development; 3) money and time management; 4) selection, care, management, and furnishing of the home; 5) selection, purchasing, preparation, serving, conservation, and storage of food; 6) selection, purchasing, care, renovation, and construction of clothing; and 7) family health and safety. Other considerations discussed are: location, the electrical system to be provided, and specific equipment needed.

2. Division of Vocational Home Economics. Guide For Planning The Home Economics Department. Columbus, Ohio: The State Department of Education, 1964.

   This bulletin provides information for school planners of home economics departments concerning the various factors to be considered in such planning. Sections of this work are devoted to:

   1. Underlying principles
   2. Location and arrangement of space
   3. General features of activity or work centers in the department
   4. Storage
   5. Equipment and furniture
   6. Auxiliary features

3. Stovall, Ruth. "Facilitating the Homemaking Program," American School and University, 1958-59. pp. 223-34.

   Departments in home economics may utilize the all-purpose space approach or the multiple room approach. Whatever approach is utilized, one major consideration is well-planned storage. Typical storage spaces needed are those designed for: 1) pupils work materials; 2) garments and wraps; 3) charts; 4) ironing boards and irons; 5) equipment for home care of the sick and first aid units; 6) equipment for child growth and development units; 7) books, magazines, and other reference materials; 8) audio-visual materials; 9) FHA materials and other teaching aids; 10) cleaning equipment and supplies; 11) aprons; and 12) staples.

4. Taylor, James L. and Johnie Christian. Planning Functional Facilities For Home Economics Education, U.S.O.E. (Special Publication #12) Washington, D.C.: U.S. Government Printing Office, 1965.

   In planning facilities for the home economics department one should consider carefully the activities to be carried on in them. This special publication is a good source book for ideas and suggestions which will be of help in planning home economics facilities.

j. Industrial Arts

1. American Council on Industrial Arts Teacher Education. Planning Industrial Arts Facilities. Eighth Yearbook. Ralph K. Nair, Editor. Bloomington, Ill.: McKnight and McKnight Publishing Co., 1959.

   This Yearbook presents principles and procedures for planning new facilities or altering laboratories now used for industrial arts activities. The early chapters are devoted to explicating the current philosophies on which industrial arts teaching is based. Later chapters provide specific details concerning laboratory planning, equipment selection, planning procedures, and evaluation of facilities.

2. Chase, William W., Johnny W. Browne, and Michael Russo. Basic Planning Guide For Vocational and Technical Education Facilities U.S.O.E. Washington, D. C., 1965.

   This booklet presents those aspects of the Vocational Education Act of 1963 which pertain to construction of area vocational schools and deal with the basic principles involved in planning such facilities.

3. Ohio Industrial Arts Association, A Guide for Industrial Arts in Ohio Schools. Columbus, Department of Education, 1960.

Industrial arts offerings no longer are limited to woodwork and mechanical drawing but must provide for subject areas more nearly representative of the vast technology of our ever expanding industrial environment. This guide outlines a program which is broadly conceived to teach aspects of industry as a part of the education of all youth.

k. Library

1. Darling, R.L. "Changing Concepts in Library Design." American School and University, 37:98-100, May 1965.

Presented here are some new ideas about libraries which maximize functionality. Areas which should be included in modern libraries are: small work spaces, listening centers, reading rooms, and discussion rooms.

2. Ellsworth, Ralph E., and Wagener, Hobart D. The School Library: Facilities For Independent Study in the Secondary School. New York: Educational Facilities Laboratories, 1963.

The frame of reference for this report is the contradiction found in the schools of America in which educators stress the value of independent study yet in which the paucity of libraries constitutes a professional disgrace. In this report are offered recommendations for the design of secondary school libraries meant for individual use.

3. Hodges, Elizabeth. "Physical Requirements for Good Library Service," American School and University, 1961-62. pp. F11-16.

The school library should be planned to contribute effectively to the school's educational program as it presently exists and as it is projected by the administration and staff. In order to accomplish this, cooperative planning of library facilities is imperative. In this article a number of features to be considered through this cooperative approach are presented. Pictures and drawings of selected libraries are included.

5. Ironside, Ivan C. "The Modern Instructional Materials Center," American School Board Journal, 145:19-21, August 1962.

The concept of an instructional materials center visualizes a location within a school where all necessary materials for

student or teacher research are gathered. Not only printed matter should be provided, but all other materials, equipment, and supplies. The author describes how this is provided in one high school.

5. Jones, Sarah, and McJenkin, Virginia. "So You are Planning a Library," School Executive, 71:51-54, May 1952.

   Each library must be designed to meet the needs of the student body, the faculty, and the school's instruction program. Nine key questions which must be answered when planning the school library are listed.

6. "Pattern of School Library Design; Symposium," Library Journal 90:5453-83, December 15, 1965.

   This article describes five high school and four elementary school libraries which are designed for exceptional use. It suggests ways personnel can improve library design.

1. Music

1. More, G.A. "Suggestions for Planning High School Music Facilities," American School and University, 1958-59. pp. 235-238.

   While the author describes the special design of a separate building for school music, the general principles could be applied to a music suite included as part of the main building. The presentation of suggestions in lists allows for easy use of materials presented.

2. Music Educators National Conference, Music Buildings, Rooms, and Equipment. Chicago: Music Educators National Conference, 1966.

   This manual provides guidelines for the music educator, the administrator, the board of education and the architect in designing and constructing new school music facilities or remodeling existing ones. It deals with these facilities at all levels from the elementary school through the university. It is concerned with the location, design and size of the facilities, with the storage and auxiliary space provided, and with the equipment placed in those facilities. It is also concerned with auditorium and music shells. In addition, it contains floor plans and photographs of recently completed music facilities, as well as a bibliography of additional references.

m. Science

1. Johnson, Philip G. Science Facilities for Secondary Schools, Misc. No. 17. Federal Security Agency, Office of Education. Washington: U.S. Government Printing Office, 1952.

   A 38 page booklet prepared to give help in planning laboratory space and other instructional facilities for science in secondary schools. The inclusion of a 25 point check list which focuses attention on factors to be considered in the planning of facilities and a bibliography of additional sources of information enhance this brochure.

2. Nation's Schools, The. "Where Science Facilities are Heading," The Nation's Schools, 72:44-6. December 1963.

   This article presents a summarization of a survey report of science facilities. Seventeen suggestions on how to set up new science facilities are presented. The survey shows also 25 ways that science education is changing.

3. Richardson, John S., Editor. School Facilities for Science Instruction. Washington: The National Science Teachers Association, 1961.

   This publication is the full report of a cooperative study by the National Science Teachers Association and the U. S. Office of Education. This study was undertaken to prepare a comprehensive and authoritative publication on science teaching facilities. The broad principles and specific details offered here should be valuable to anyone involved in the planning and construction of such facilities.

4. Williams, Herbert N. "The Planetarium in Modern Education," American School Board Journal, 141:40, September 1960.

   The planetarium in a school serves more than a limited purpose. It promotes intellectural curiosity in mathematics, chemistry, physics, and geography and serves to break down artificial barriers between different branches of scientific knowledge. How the planetarium is used in one school is the topic of this article.

n. Special Education

1. American Standards Association. Specifications for Making Buildings and Facilities Accessible To, and Usable By, the Physically Handicapped. New York: The National Society for Crippled Children and Adults, 1961.

   The most common design and construction of buildings and facilities cause problems for the physically handicapped. These architectural barriers make it very difficult to project the physically handicapped into normal situations of education, recreation, and employment. Here are presented specifications which represent minimum requirements for planning, designing, and constructing buildings to overcome the obstacles described above.

2. Chatelam, Leon, J. "More Accessibility For Handicapped" Rehabilitation Record. Washington, D.C.: The Vocational Rehabilitation Administration, U. S. Department of Health, Education, and Welfare, November-December 1966.

   Since barriers to the handicapped are usually built into buildings by the thoughtlessness of architects, they have become known as "architectural barriers." Various interested groups are now actively working to eliminate these barriers in existing buildings and to have new buildings designed entirely accessible and usable by the handicapped.

3. Geigle, Ralph C., and Zeugner, Lorenzo. "Special Education Center," American School Board Journal, 143:18-20, December 1961.

   The authors describe a building designed specifically for handicapped youngsters. This facility includes space for the educable retarded, the trainable, the physically delicate, and the severely physically handicapped. A list of the facilities and special features of the building is included.

o. Speech

1. Boase, Paul H., and Glancy, Donald R. "Speech Facilities for the Modern Secondary School," American School Board Journal, 144:37-39, 50. June 1962.

   A balanced speech program in the modern high school should include a wide range of activities. To house these activities, facilities for teaching the fundamentals of speech, a sound control and listening room, a forensic workshop, a speech correction room, and a little theater, all fully equipped, should be provided.

F. Write Educational Specifications

1. From School Program to School Plant, pp. 127-130.

2. Guide for Planning School Plants, pp. 15-16.

3. Planning America's School Buildings, pp. 171-175.

4. Rosenstengel, W.E. "Developing the Educational Specifications for the Secondary School Plant," High School Journal, 40:50-53, November 1956.

   This author avers that the development of the general characteristics and the detailed features of the school program in relation to planning a functional school plant results from the thinking and planning of many people. Among those suggested to be included are:

   1. The superintendent of schools
   2. The board of education
   3. An educational consultant
   4. The classroom teachers
   5. The pupils
   6. Operation and maintenance personnel
   7. Lay citizens of the community

5. Willey, David A., and Hanson, Nels W. "Is There Vision in Your Educational Specifications," American School Board Journal, 146:33-6, June 1963.

   Educational specifications constitute a written communication from the educators to the architect comparable to the blueprints and explanatory data which become the written communication from the architect to the builder. Basic responsibility for their preparation rests on the school superintendent. The authors suggest what these specifications should include and suggest both format and topics for them.

6. Typical educational specifications for new buildings, The Ohio State University, Educational Administration and Facilities Unit, College of Education.

G. Review Architectural Plans

1. From School Program to School Plant, pp. 131-132 and 181-185.

2. Spairo, J.W. "How Can I Decide If a Building Plan is Good?" American School Board Journal, 144:41-42. May 1962.

   A school board member outlines principles and procedures for school boards to follow in considering school building plans. He points out that evaluation of the plans should be based on what the stated objectives of the school are and on a knowledge of the community.

VI. The Architect And His Work

A. The Selection of an Architect

1. From School Program to School Plant, pp. 159-166.

2. Guide for Planning School Plants, pp. 16-17.

3. American Institute of Architects. "Selecting an Architect for School Building Construction," School Plant Studies, BTI-37. Washington: American Institute of Architects.

   A great many things must be considered in selecting an architect. Since educational facilities through the classroom environment strongly influence children during the formative years only men of the highest integrity, judgment, business capacity, and artistic and technical ability should be chosen to provide architectural services.

4. Garber, L.O., and Tyree, M. J. "Legal Principles Govern Employment of Architect," The Nation's Schools, 66:90-91 November 1960.

   The first in a series of four articles. This series describes litigations involving school boards and their architects, isolates legal principles set down by the higher courts, and refers to cases involving other types of corporate bodies and individuals when these are applicable to school situations. This first article reviews the legal considerations involved when a school system employs an architect.

5. Larson, A.A. "How to Hire the Right Architect for Your District," School Management, 5:64-68, September 1961.

   Hiring the architect is one of the few major decisions in school plant planning that the school board and superintendent must make almost entirely on their own. The author suggests a

10-step selection procedure. These steps are:

1. Be prepared
2. Send out "feelers"
3. Eliminate disinterested architects
4. Investigate
5. Rank the architects (a suggested rating scale is presented)
6. Interview "high scorers."
7. Reevaluation
8. Visitation
9. Final evaluation
10. Final interview

B. The Architect's Work

1. From School Program to School Plant, Chapters 8 and 9.

2. Guide for Planning School Plants, p. 18.

3. Planning America's School Buildings, Chapters 3, 6, and 11.

4. American Institute of Architects. "The Services of an Architect in School Building Planning," School Plant Studies, BTI-39. Washington; American Institute of Architects.

   This paper lists ten functions of the architect in school facility planning. The authors expand on the architects' role in educational programming, preliminary drawings, working drawings and specifications, estimate of cost, and construction supervision.

5. Blundell, V.I. "The Clerk of the Works in a Schoolhouse Construction Program." American School Board Journal, 124:41-43. April 1952.

   An individual hired to protect the board's interests in schoolhouse construction can pay dividends. The "clerk of the works" is responsible to the board for seeing that all contractural obligations are met. The author expands the discussion of this position and describes the qualifications for such a person, the relationship which this person should have with the various personnel involved in schoolhouse construction, and the responsibilities and duties assigned. A summary chart gives a summary of the responsibilities and duties of the "clerk of the works."

6. Canty, Donald. "What Architects Do and How to Pay Them," Architectural Forum, 119:92-5. September 1963.

The title of this article aptly states the subject matter with which the author concerns himself. Laymen will be interested to note that the American Institute of Architects publishes the document entitled B-131 which is a standard owner-architect contract form. The author cautions however, that B-131 is only a starting point for gaining an understanding of what the complex and changing profession of architecture is all about.

7. "What It Takes to Be a Client: How To Turn A Set of Plans Into A Building" Architectural Forum, 120:106-9. April 1964.

The author discusses the varying relationships which develop among the architect, the contractor(s) and the client-owner before, during, and after the construction of a new building.

8. Davis, A.W., and Curtis, N.C. "Architecture Creates Environment," The Nation's Schools, 63:95-100. May 1959.

The school environment, i.e. the surrounding conditions, the influences or forces that modify the actions of human beings, can greatly influence the ability of the educational process to function as it should. The necessary ingredients in creating a proper environment for children fall into 2 broad categories: aesthetics and physical setting. Such factors as scale and proportion, color and texture, plantings and taste affect the aesthetic. Light, temperature, quiet, and shelter represent physical factors. Since, to a child, the ideal environment is not in school, but out-of-doors, the nearer the architect comes to reproducing the out-of-doors, the better the environment.

9. Engelhardt, N.L., Jr., "Time Required to Plan and Construct a School Building," American School Board Journal, 150:25-6 Jan. 1965.

Dr. Engelhardt lists 7 stages of planning and construction which affect the time of completion of a new school. These stages are:

1. Time required for selection of architect, consultant and site.
2. Time required for preparation of the program of requirements or educational specifications.

3. Time required between receipt of the program of requirements and the completion of preliminary plans.
4. Time required between preliminary plans and the beginning of final drawings.
5. Time required from approval of preliminary plans to completion of final drawings and specifications.
6. Time required between approval of final drawings and receipt of contractors bids.
7. Time required from acceptance of the bid to completion of the building.

10. Franzen, Carl B. and Alkin, Marvin C. Legal Aspects of School Construction. Palo Alto, Cal.: School Planning Laboratory, School of Education, Stanford University, 1964.

This monograph provides information concerning the many kinds of difficulties, particularly legal difficulties, that can occur during school construction activity. Also included are a number of suggestions for establishing safeguards against potential hazards so that these difficulties may be minimized or averted.

11. Martin, George M. "The Architect's Place in Developing Plans and Specifications," Teamwork in the School Plant Program. Robert Pierson, Editor. Columbus: The Ohio State University, 1954, pp. 5-7.

This paperback publication is a report of the general sessions and group discussion of a conference for school administrators and school architects held at The Ohio State University in July 1954. Topics discussed are: 1) the superintendent's place in determining school plant needs, in developing educational specifications, in developing plans and specifications, and his view of the relationship of building materials to program maintenance and 2) the architect's place in determining school plant needs, in developing educational specifications, in developing plans and specifications and his view of the relationship of building materials to program maintenance.

12. Neutra, R.J. "Theory of School Design: School Building In Its Context," American School Board Journal, 130:58-60. January 1955.

Education, defined as a cluster of measures which influence younger human beings, can be greatly advanced if proper attention is given to school plant design. The theory of school plant design proposed in this article is based on systematic observation of life processes such as growing,

maturing, fatiguing, assimilating, absorbing. The author proposes that classrooms must be designed to enhance the learning experience, not only here and now, but in the future when possible advances in curriculum and teaching-learning theory could dictate an acute alteration in such design. The school as the neighborhood center is also discussed.

13. Whitehead, Willis A. "The Architect and School Planning," School Executive, 66:11-14. April 1947.

The school building architect must design a building that can most effectively house a specified program of education under local conditions. Frequently he must also supervise its erection. Therefore, selection of an architect is one of the most important tasks a board of education faces. The buildings architect should be hired whenever his advice and ability can make a contribution to the effective development of school-building planning. The author offers advice concerning the essential qualities of the architect and discusses the architect's function in some detail.

VII. Moving In and Settling Down

A. Furniture and Equipment

1. From School Program to School Plant, pp. 209-213.

2. Guide for Planning School Plants, pp. 18-19.

3. American School and University, all issues.

4. Brainerd, David S. "Selection of Equipment in Elementary Schools," American School and University, 1955-56, pp. 181-184.

"Equipment which does not make a contribution to the educational program is superfluous." To best insure that equipment will contribute to the educational program, teachers and pupils who use the equipment should be given the opportunity to participate in its selection. This suggests the appointment of a committee or committees charged with selection responsibility. Such committees should have certain standards or criteria as a guide to direct the selection. Some general principles are: 1) safety, 2) economy, 3) general utility, and 4) aesthetic quality.

5. Brennan, Jean F. "The Evolution of School Furniture, American School Board Journal, 147:31-3, September 1963.

An account of the history of American classroom furniture from early Colonial times 300 years ago, to modern day usage which concludes with some predictions for the future.

6. Casey, Leo M. "Selection of Equipment in High Schools." American School and University, Vol. 27, 1955-56. pp. 253-256.

Five rules of procedure in equipment selection in high schools are offered. These are: 1) the selection process should begin early, 2) it should involve all concerned, 3) those selecting equipment should be charged with definite areas of operation, 4) it should be subject to review by school administrators, and 5) maximum use should be made of non-staff resources. Criteria for selecting equipment are offered. These include:

1. Serviceability
2. Availability
3. Flexibility
4. Convenience
5. Durability
6. Attractiveness
7. Economy

7. Engelhardt, N.L., Jr. "How to Purchase Equipment for a New School." School Management, 6:74-81. July 1962.

This article presents a step-by-step program for determining equipment needs, for writing the educational specifications to fill these needs, and for putting them out to bid. Such a procedure can save time, money, and misery if carried out before the architect makes his first sketch.

8. Handel, Harvey. "How to Equip and Furnish the New School," School Executive, 77:45-51, March 1958.

Equipping a new school cannot be compared to furnishing any other type of private or public building. The furniture in its rooms must reflect and assist the type of instruction which is planned for the room not only for the present but for the long range future. The author offers some "do's and don't's" to guide in equipping and furnishing a new school.

9. Sanders, David C. Innovations in Elementary School Classroom Seating (Research Report) Austin, Texas: The University of Texas, 1958.

   Classroom furniture to serve all learning activities, must lend itself to multiple use; that is, there must be flexibility in who uses which piece of equipment for what purpose at different times. This article deals with questions about curriculum, method, classroom control, discipline, and teacher security which arise when flexible furniture is installed in a classroom and the teacher is truly flexible in its use. Portions of this report reporting the research technique used may be of interest to those interested in research in this area.

10. "School Furniture," American School Board Journal, 150:21-58 March 1965.

    This citation is, in fact, a collection of articles and advertisements--a separate "bookazine" dealing with school furniture. Articles appearing in this section are:

    1. "Present Furniture Trends Promise Exciting Future" - B. W. Henrikson
    2. "Aesthetic Value Being Violated" - Harold Silverthorn
    3. "'New Language' in Library Furnishings" - Bernard Morcheles
    4. "Mr. Administrator: Beat Fatigue . . . On Your Feet" - Robert Propst
    5. "Accumulative Storage Problem Has Flexible Solution" - Joseph St. Cyr
    6. "Refurnish?. . . Replace? Here's the Answer" - H.S. Warvel
    7. "Furniture - Tools of Learning," Pictorial Feature
    8. "Save Space, Dollars with Multiuse Rooms" - Thomas J. McCarthy
    9. "Specific Or General - Shops Require Individual Planning"
    10. "Teamwork Science Habit - Results In Ideal Lab" - James R. Irving
    11. "Sample Purchasing Proves Practical Method" - William L. Boyd
    12. "Service Gets Its Efficiency From Proper Equipment" - Thomas Farley
    13. "New Products In The Field"

B. Occupying A New School Plant

   1. From School Program to School Plant, Chapter 10.

   2. Guide for Planning School Plants, pp. 18-19.

   3. MacConnell, James D. Planning for School Buildings, Chapter 12.

4. "Using A New School," School Executive, 71:59-70, December 1951.

   Many people use a new school building: children, adults, teachers, janitors, lunchroom employees, engineers. All these people should be taught to use it. This series of articles is devoted to this subject. Titles of included articles are:

   1. "The Superintendent Teaches Use of New Plants"- Shaw, Archibald
   2. "Teaching the Staff"- Atwan, A.M.
   3. "Teaching the Custodian"- Norrix, Loy
   4. "Teaching Community Agencies"- Monson, Eva C.
   5. "Teaching the Community"- Little, Harry A.

5. Wright, Ralph, and Johnson, Jennings. "Moving Into A New School," Overview, 2:61-2, April 1961.

   When moving into a new school from a former school, adequate planning and preparation can make the task smoother and easier. Suggestions are offered by the author for the school staff contemplating this task which if followed can ease the tensions usually inherent in such a move.

C. Training The Staff And Pupils

1. From School Program to School Plant, pp. 213-215.

2. Guide for Planning School Plants, p. 19.

3. "How Teachers are Being Taught to Use the New McPherson High School," School Management, 6:63-67, April 1962.

   Given a new school with almost every modern idea which can be incorporated into a modern building one would expect great things. Not so, state the authors, unless teachers are taught to use the new facilities. School personnel at McPherson, Kansas have developed a five stage program to perform this task. Pictures and illustrations supplement the text.

D. Assembling Building Documents

1. From School Program to School Plant, pp. 217-218.

2. Guide for Planning School Plants, p. 19.

E. Presenting The Building To The Public

1. From School Program to School Plant, pp. 215-217.

2. Guide for Planning School Plants, p. 19.

3. Crosby, O.A. "Build Community Friendship at School Plant Dedication," The Nation's Schools, 60:60-63, October 1957.

   "The dedication of a school building is a special occasion for bringing the people of the community into the school, as well as for bringing information about schools to the people." Many opportunities are provided through the dedication ceremony to advance the cause of the school and to create an aura of good feeling among school patrons. Suggestions are offered concerning timing, program items, and other facets of a successful dedication program.

4. Holmes, G.W. "Acquainting Faculty and Community With The New School Plant," High School Journal, 40:63-66, November 1956.

   "The best way to introduce faculty and community to the new school plant is to encourage them to participate in planning." The author offers suggestions concerning how to implement this and other types of methods to acquaint faculty and community with new school buildings.

F. Evaluating The Building

1. See "Plant Evaluation" under Section IV, Districtwide Building Survey.

VIII. Related Topics

A. Who Should Be Involved?

1. From School Program to School Plant, Chapters 1 and 7.

2. Guide for Planning School Plants, pp. 3-5.

3. Planning America's School Buildings, Chapter 11.

4. Baggs, B. "Departmental Approach," American School Board Journal, 138:32, January 1959.

   In planning new schools, significant gains may be made by including teachers and other persons affected in conducting

the research and investigation necessary for planning the future programs and for the discovery of workable ideas for their implementation. From such involvement will come valuable recommendations concerning the program, staff, and facilities required for the various content areas in the new high school.

5. Cochran, Lee. "Problems of the School Architect," Proceedings--The Association of School Business Officials, 1952, pp. 184-189.

   The architect's work can be divided into 4 phases: Programming, Basic Design, Working Drawings, and Supervision. Problems which arise in each of these areas are delineated in this article. These problems include such things as: 1) defining quantitatively and qualitatively the scope of the project, 2) budgeting, 3) professional decisions relating to the structural system to be used, site location, materials specifications, etc., 4) preparation of pertinent documents, and 5) interpreting and explaining plans to professional educators and the lay public as represented by the board of education.

6. Endres, M.P. "School Planning: Who Can Help and How?" National Elementary Principal, 30:36-43, September 1959.

   Cooperative planning of school plants means actual participation of all individuals involved, not just "rubber stamping" of plans laid out by the "powers that be." By this method a better understanding among parents, teachers, and school planners of what children are like and how they learn may be gained. In addition, such planning improves the mutual understanding of these groups concerning what kind of physical environment is best for their children in their school and allows these groups to make plans and recommendations whereby such buildings will be possible.

7. Grossman, H.J. "Planner Looks at Schools," American School Board Journal, 150:27-8, May 1965.

   The author provides a discussion of the elements which go into school site selection. He strongly advocates cooperation with city and community planners. A 12 item list of criteria for school site selection is included.

8. Guenther, Carl F. "Educational Consultants -- Their Function and Work," American School and University, 1954-55. pp. 113-116.

   Since school building programs seem to be continuous, the need for the services of the educational consultant will continue and increase. It is his province to conduct the continuing

study of the relationship of building to child development, of building to educational program and building to adult participation on a community-wide level. The educational consultant is a permanent member of the team to assure the continued creative development of education in our society. The author delineates studies to be conducted and describes the work of the consultant.

9. Herrick, John H. "Architect Versus Educational Consultant--Services are Distinct and Different," The Nation's Schools, 44:34, October 1949.

   This article is one of a triad presenting 3 points of view. Here Dr. Herrick contends that the educational consultant and the architect are symbiotic members of the planning team whose services are distinct and different but each vital to the other.

10. vanNuys, Jay C. "The Architect and the Tailor-Made School," American School and University, 1951-52, pp. 139-142.

    Before beginning his job of building design, an architect should have a myriad of facts about a school and the community. Some of these are:

    1. The physical characteristics, location, and relationship to surrounding elements of the school site and the activities which will be conducted on it
    2. Information about enrollment -- present and future
    3. What educational activities will be conducted in and near the proposed building and how they will be conducted
    4. Size of classes
    5. Purpose of the school
    6. Prospects for graduates
    7. Use of building by adults; activities in conjunction with adult programs
    8. Facilities, equipment, and fixtures needed
    9. Future expansion and flexibility

    Possible means to acquire these facts are suggested.

B. Remodeling and Renovating

1. Planning America's School Buildings, Chapter 13.

2. "Can You Renovate During The School Year?" School Management 9:168-71, July 1965.

   This article explains how a school system installed a new

boiler system during the school year. The author emphasizes the importance of planning and demonstrates that buildings can be renovated without disturbing class activities.

3. Castaldi, Basil. "Generalized Mathematical Formula for School Modernization," American School Board Journal, 148:41-3, January 1964.

   The author presents a general formula which provides a systematic and logical approach in the decision-making process underlying school modernization. It places a strong emphasis on facts and enables school planners to base decisions on desirable educational outcomes and financial efficiency.

4. Dolan, G. E. "01' School Gets New Light, Life," American School Board Journal, 150:46-7. June 1965.

   Tackling the problem of re-lighting an old building can be more challenging and exciting than planning lighting systems for new buildings.

5. Linn, Henry H. "Modernizing School Buildings," American School and University, 1952-53. pp. 401-405.

   The fundamental question to be asked before undertaking a rehabilitation and/or modernization program for a given school building is "will the structure serve the desired educational program at this general location for an extended period of time both properly and adequately after it has been modernized." Subsidiary questions to be answered deal with adequacy of site, level of safety and health factors, structural soundness, and economy.

6. Miller, Graham R., Schoene, Carl H., and Armstrong, Charles E., Jr. "School Building Modernization Programs," American School and University, 1955-56. pp. 365-370.

   The authors identify 2 basic principles which serve as guides in planning a program of school plant rehabilitation and modernization. These are: 1) health and safety of the children who occupy the school buildings, and 2) instructional adequacy. A description of some practices used in Denver comprises the bulk of the article.

7. Nichols, R.A. "How We Modernized An Older School," American School Board Journal, 136:48-50, May 1958.

   When it is not practical, economical, or even possible to contemplate new construction to solve school housing problems, remodeling and renovation of older structures, if properly planned, can provide the answer. The author offers suggestions to be considered when conducting such changes.

8. Sessions, E.B. Rehabilitation of Existing School Buildings or Construction of New Buildings, Research Bulletin No. 2 Chicago: The Research Corporation of the Association of School Business Officials, 1964.

   This report, in questionnaire form, deals with the problems of school building rehabilitation under four headings: Educational Obsolescence, Site and Location Obsolescence, Structural Obsolescence, and Additional Considerations. The questions when answered in terms of specific school systems can serve as a guide for determining whether to build anew or to rehabilitate old structures.

C. The School Site

1. From School Program to School Plant, Chapters 4 and 12.

2. Guide for Planning School Plants, Chapter 3.

3. Planning America's School Buildings, Chapter 10.

4. Darby, F.C., and von Metske, R. "'Slope Plan' Pinpoints New School Sites," The Nation's Schools, 68:50-54, August 1961.

   The authors present a plan for selecting school sites based on an analysis of topographical factors. Assumptions are held that usable ultimate density factors can be developed for arbitrary land slope categories and that residential densities will be roughly inversely proportional to the slope of the land, that is most of the people will live on the flat, easily sub-divided land, and few people will reside on the mountainous terrain. Slope category factors are not universally applicable, however. A careful analysis of past, present, and proposed land development practices on land, lying within or close to the study area, is necessary in order to develop these factors for a given area.

5. DeBernardis, Amo, and Keefe, Lloyd. "They Plot Sites for Future Schools," School Executive, 78:68-69, April 1959.

Through cooperation with the local planning commission one district has been able to plan for, locate, and purchase desirable school sites early enough to produce considerable savings in site acquisition funds. By applying the 5 helpful principles which are delineated in the article, locations of school sites were made so as to be complemented by city parks thus again reducing cost because sites so located can be shared.

6. DeShaw, Elton R. "Planning the School Grounds," American School and University, 1951-52. pp. 217-220.

A master plan for school site utilization should be prepared. "The master plan", says the author, "should meet the vital needs of pupils, serve most individuals and groups in the community, and permit construction of the most needed facilities with other areas following as needs and funds will allow." Provision should be made for a variety of outdoor activities and special areas should be developed for young children. Some important considerations in school grounds planning are: unit orientation, safety factors, parking, seating, sanitation, and drainage.

7. Kruzner, D.L. "Schools in Total Community Planning," American School Board Journal, 128:37-39, May 1954.

Comprehensive community planning should include a consideration of the many factors which influence the use of land by its people. These factors include not only the basic physical factors but the more intangible factors such as the sociological and economic developments growing out of the desires of the people in the area. This article reports how this is applied in King Co., Washington.

8. MacPherson, V.D. "Where Shall We Build?" The Nation's Schools, 55:53-55, April 1955.

The author suggests that in the modern era the school is an institution which belongs to the entire community. It is the community headquarters for youths, and is increasingly becoming a meeting place and cultural center for adults as well. Therefore its location is a decision facing school personnel. Here are provided "do's and don't's" gleaned from the author's long experience as a purchaser and developer of school sites.

9 Smith, H L. "Why We Need Large Sites," Indiana University Education Bulletin, 30:11-17, September 1954.

Two major factors which create a need for larger school sites are: 1) the increasing possibility, probability, and desirability of supplementing indoor instruction with outdoor instruction on the school grounds, and 2) the increasing use of school ground for community programs which complement the school program. The author provides specific examples showing how these 2 factors create the need for enlarged school sites.

10. Taylor, James L. School Sites - Selection, Development and Utilization, U S Department of Health, Education, and Welfare, Office of Education (Special Publication No 7). Washington D C.: U S. Government Printing Office, 1958

Logical locations for school sites requires extensive study. This publication illustrates approaches which may be used by local groups to determine school-site requirements. An extensive bibliography is provided.

11. Wynn, William J. "The Modern Secondary School Site -- Or Is It Sight," High School Journal, 44:154-6, January 1961.

School administrators must look beyond the usual considerations in selecting school sites. Future programs must be provided for through imaginative advance program analysis and planning. The author sums up his thoughts in five terse guiding statements.

12. Typical Site Selection Reports, The Ohio State University, College of Education, Educational Administration and Facilities Unit.

D. Thermal Environment

1. From School Program to School Plant, pp. 193-194, and Chapter 22.

2. Guide for Planning School Plants, Chapter 9.

3. Planning America's School Buildings, Chapter 14.

4. American School Board Journal "Two Studies on Thermal Environment and Learning," American School Board Journal, 147:22-4, December 1963.

This article is a report of studies on school thermal conditions conducted by the Iowas Center for Research in School

Administration, University of Iowas, Iowas City, Iowa, in cooperation with Lennox Industries, Inc., Marshall Town. Results show that there is a correlation between thermal environment and mental efficiency.

5. Harris, J.W., Editor. "Should Your Next School Be Electrically Heated?" School Management, 4:34-38, 75-77, August 1960.

Electrical heat for schools is not the answer despite many desirable features unless certain conditions can be met. These conditions are: 1) the offer of a preferential rate by the power company, 2) the inclusion of an electrical heating system in original building plans, 3) the selection of a school design which favors compactness, and 4) the provision in the school program for a high pupil density in the areas of the school to maximize the effect of heat from lights and body heat. Among the desirable features presented are flexibility, ease of maintenance, low maintenance cost, dependability and others.

6. Smith, N.B. "Electric Heating and School Design," American School Board Journal, 138:48-49, February 1959

Even though operating costs are considerably higher when using electrical heating, savings in original construction costs will offset this higher cost for about the normal life expectancy of the building. However, care must be exercised in original planning to minimize exterior wall surfaces where heat loss is maximized.

7 Stuart, Fred, and Curtis, H.A. Climate Controlled and Non-Climate Controlled Schools. Clearwater, Fla: Pinellas County Board of Public Instruction, 1964.

This research study compared the cost of construction of one climate controlled building with that of one non-climate controlled school and attempted to determine the similarities and differences between the climate controlled and non-climate controlled schools with respect to operating costs and general quality and the comfort, achievement, conduct and health of the students.

8. "Thermal Environment." Nation's Schools, 63:84-142, May 1959.

A portfolio of articles designed to provide a basic understanding of:

1. The relationship of thermal environment to learning
2. The planning and design elements that make for good or poor thermal environment

3. The systems generally used for heating and ventilating school buildings, and their applications to special purpose rooms
4. The special problems introduced by immediate or future year-round air conditioning
5. New developments in methods and systems for thermal control

9. U.S. Public Health Service Division of Environmental Engineering and Food Protection. Environmental Engineering for the School: A Manual of Recommended Practice. Publication No. 856. Prepared by Floyd B Taylor and others. Washington: U. S. Government Printing Office, 1961.

   A succinct and practical presentation of public health considerations in the school plant. That the environment in which school children spend a large portion of their day should be both as suitable and as healthful as possible has been an accepted premise for many years. This document is intended as an over-all statement of basic environmental criteria for schools, by which either existing or planned facilities could be evaluated. Check lists offered at the end of each chapter can be of help for this latter purpose.

10. Wright, Henry. "Some Blunt Facts About Air-Conditioned Schools," School Management, 4:62-66, April 1960.

    As the key to summer time schooling, air conditioning, by opening the door to full-time operation of the educational system may turn out to be one of the most important things which has happened to schools and schooling in recent years. On this basis, it warrants the careful scrutiny of everyone interested in educational progress. This article provides factual data about comparative costs and about the need for air conditioning in public schools.

E. Visual Environment

1. From School Program to School Plant, Chapter 21

2. Guide For Planning School Plants, Chapter 10

3. Planning America's School Buildings, Chapter 9

4. American Standard Association. American Standard Guide for School Lighting. New York: Illuminating Engineering Society, 1962.

   This guide provides advice for those designing lighting systems in terms of acceptable standards based on research and field practice. It is also a good source for those interested in the general aspects of the visual environment of school classrooms.

5. Barthelme, Donald. "Top Lighting vs. Side Lighting for School Interiors." American School and University, 1954-55. pp. 397-400.

   This article treats the subject of side lighting vs. top lighting. The author argues for the use of natural light as opposed to artificial light because of its inherent advantages.

6. Gibson, C.D. "Today's Concepts in School Lighting," American School Board Journal, 150:21-4, June 1965.

   Responsible administrators can do much to improve seeing conditions in school buildings without improving lighting systems or spending additional money for equipment or supplies.

7. Ketcham, Howard. "These Colors Fit Your School Decor," The Nation's Schools, 74:61,80, November 1964.

   Avoid raw red, intense orange, purple and white in school interior decor advises Howard Ketcham, but make use of imaginative color treatments for classrooms, corridors, and assembly rooms. Studies show that proper color scheming can make a difference in the social habits, health and safety habits, work habits, and in performance in the content subjects. Recommended colors include apricot, blue, and buff with various shadings as indicated by lighting conditions.

8. Sampson, Foster K. "Effects of Teaching Equipment and Supplies on Visual Environment," School Plant Studies, BT 1-42. New York: American Institute of Architects.

   We now have research on vision and evaluation of light levels necessary for a particular accuracy of seeing for a wide variety of tasks. Some of the pertinent findings in this area are presented in this paper.

F. Sonic Environment

1. From School Program to School Plant, Chapter 21.

2. Guide for Planning School Plants, Chapter 8.

3. Planning America's School Buildings, Chapter 9.

4. Conrad, M.J. and Gibbins, Neil. Carpeting and Learning, Columbus: Bureau of Education Research and Service, The Ohio State University, 1963.

   This study of acoustical floor covering was developed to determine how carpeting affects the total sonic environment and whether it has any effect upon pupil behavior and learning.

5. Fitzroy, David and Reid, John Lyon. Acoustical Environment of School Buildings, New York: Educational Facilities Laboratories, 1963.

   This is a report of a detailed study conducted by an architect and an acoustical engineer and questions some long-standing "authorative" standards. Although this is a technical report, it has some interesting content for the non-technical reader.

6. Richards, Roy. "Thoughts on School Acoustics," American School Board Journal, 145:25-38, July 1962.

   It is possible, through the proper application of basic physical principles, to create almost any desired acoustical environment. How these environments may be created and used in schools is the topic of this article. An initial discussion of the more important acoustical terms is made and some suggestions are offered about acoustical design in the several parts of the school building.

7. Hanle, Robert A. "Engineering For Sound Control in School Buildings." American School and University. 1954-55 pp. 401-408.

   The sound control problem in school buildings has 2 dimensions - sound control necessary for good speaking and listening; and noise control required for physiological and psychological comfort. This is an excellent treatment of both dimensions.

G. Flexibility and Expansion

1. From School Program to School Plant, pp. 176;234; and 263-264.

2. Guide for Planning School Plants, pp. 92-93.

3. Bruce, William C. "Planning A School Fallout Shelter," American School Board Journal, 143:28-39, November 1961.

   Conclusions from a study concerning school houses as fallout shelters reported in this article indicate that fallout shelters can be constructed in conjunction with and as a part of other facilities for less cost than if constructed separately.

4. Educational Facilities Laboratories. Relocatable School Facilities. New York: The Laboratories, 1964.

This report has been prepared to define more clearly the problems that have led to the need for relocatable housing, to present some guides for planning such buildings, and to review experience in the field. Pictures and illustrations are provided of some types and styles of relocatable school facilities now in use.

5. Educational Planning Section, "Flexible School Buildings" School Executive, 65:55-74, May 1946.

In order that school buildings will not become monuments to outworn and outmoded educational theories of the past, they must be designed so as to be adjustable to changing educational programs. This series of articles treats the subject of flexibility in schoolhouse construction in a comprehensive manner. Articles included are:

1. "Why School Buildings Should Be Flexible" - Hosler, Fred W.
2. "Ways in Which Flexibility Can Be Achieved" - Hamon, Ray L.
3. "What An Architect Must Know In Order To Provide Flexibility" - Perkins, Lawrence G.
4. "Technical Problems To Be Overcome In Achieving Flexibility" - Scherer, Francis R.
5. "Designing the Exterior of a School Building To Secure Flexibility" - Marsh, Reginald E.
6. "Designing the Interior of a School Building To Secure Flexibility" - Clapp, Wilfred F. and Harris, Clark E.
7. "Advantages of One-Story Buildings in Securing Flexibility"
8. "Modular Construction Applied To Schools" - Nocha, Paul F.

6. Reid, John Lyon. "The Solution--School Plant Flexibility," Planning the Secondary School--1960 and Beyond, (Report of a Conference for School Administrators and Architects.) Columbus: The Ohio State University, 1956.

This conference concerned itself with the changing educational program and the implications which follow for school facility design and construction. The group session reports constitute the bulk of this volume.

7. Richardson, L.S., and Caudill, William W. "Towards an Economical Flexibility," American School and University 1954-55, pp. 441-448.

This report shows how one school district obtained economical flexibility in the design of its new high school by 1) arranging

space for an increasing enrollment, and 2) by providing space to house any type of curriculum - all this on a limited budget. An excellent discussion of flexibility in schoolhouse construction and an interesting delineation of the quality of expandability, the quality of convertibility, and the quality of versatility can be found here.

8. Silverthorn, Harold. "Flexibility, A Fact or An Illusion?" American School Board Journal, 150:19-21, January 1965.

   The author presents William Caudill's analysis of the 3 types of flexibility (immediate, overnight, and over-the-summer), lists 13 "earmarks" of adaptable space, and provides visual evidence of the modifiability potential of a school building in a set of 4 pictures.

H. Economy

1. From School Program to School Plant, Chapter 23.

2. Guide for Planning School Plants, Chapter 11.

3. Planning America's School Buildings, Chapter 12.

4. Boles, Harold W. "Fact and Fancy in School Building Economy," American School Board Journal, 141:25-27, January 1959.

   This article lists twelve of the most commonly heard statements regarding the need for economy in planning and constructing school plants. A thirteenth statement, the author honors only as a canard, yet discusses to some extent its implications along with the other twelve.

5. _____. "Proper Educational Planning Can Help Reduce School Plant Costs," American School Board Journal, 136:39-40, June 1958.

   This article is the second in a series of eight articles which offers a comprehensive inventory of ways to obtain maximum usage from school building funds. It shows how effective educational planning can help avoid unnecessary school construction expenditures through 18 suggestions which are discussed. The series was initiated in the May 1958 issue and continued monthly for the rest of the year.

6. _____. 258 Ways to Save Money in Planning and Constructing School Buildings. Kalamazoo: School of Graduate Studies, Western Michigan University, 1963.

This booklet presents a comprehensive list of economy factors, most of which are universally applicable to reducing costs of school plants.

7. Commission on School Buildings, State of New York. Economy Handbook, Economies from A to Z In Planning and Building Schools. Albany: The Commission, 1953.

This pamphlet is one in a series of handbooks developed under the auspices of the New York State Commission on School Buildings for the information and guidance of local school officials and others concerned with school building. A general description of economies is provided and check lists of specific economies follow the discussions.

8. National Council on Schoolhouse Construction. Principles of Economy in School Plant Planning and Construction. Nashville: The Council, 1954.

This manual focuses attention on certain basic principles of economy and illustrates these with some proposed economies in school plant planning and construction. An extensive bibliography is included.

9. Pierce, David A. Saving Dollars in Building Schools. New York: Reinhold Publishing Corporation, 1959.

This book brings all areas of economy into proper focus so that those concerned with school construction can better evaluate the building program. The ultimate result will be a greater return for the educational dollar, both in physical plants and in teaching achievements. Especially valuable in this publication is the comparison of total annual costs, including those costs associated with heating and maintenance, as an antidote to uneconomical cheapness.

10. Silverthorn, H. "Factors that Produce Economy in Schoolhouse Construction," The Nation's Schools, 53:71-74, May 1954.

The greatest obstacles to economy in schoolhouse construction exist only in the minds of the persons responsible for direction of the school building program. Economy is achieved only through bringing as many favorable factors as possible to play in any one given situation. The author discusses some of these factors.

11. Stollar, Dewey. "How to Market Bond Issues," The Nation's Schools. 74:50-1, November 1964.

    The first of two articles on school bond issues, this essay treats what to include and exclude from the bond sale notice.

12. The Editors. "Ten Deceptions in Building Cost Comparisons," Overview, 3:36-39, July 1962.

    Comparisons made between the cost of one school building and another are subject to a number of factors which must be taken into account before anyone can judge whether a particular building cost more or less than others like it. This article is a compilation of 10 of the more important factors which may have more influence than inflation on unit costs for a given building.

I. Size Of The Center

1. From School Program to School Plant, pp. 69, 90-93, 226-227.

2. Barker, Roger G. and Gump, Paul V., Big School, Small School: High School Size and Student Behavior, Stanford, California: Stanford University Press, 1964.

   A study of school size in relation to the behaviorial aspects of the student body in which the authors conclude that "a school should be sufficiently small that all of its students are needed for its enterprises. A school should be small enough that students are not redundant."

3. Candoli, I.C. and Leu, Donald. A Feasibility Study of the "Cultural-Educational Park" for Chicago: Chicago: Board of Education, 1968.

   This report contains an excellent discussion of the educational park concept and its historical development along with the analysis of the feasibility of the concept in the Chicago community.

4. Kowitz, Gerald T., and Sayres, William C. Size, Cost, and Educational Opportunity in Secondary Schools. Albany: The University of the State of New York, The State Education Department, Division of Research, May 1959.

   This report discusses the relationships between size, cost, selected institutional characteristics, selected library characteristics, and selected characteristics of the teaching staff. Conclusions reached are that a school district should

be at least large enough to support a complete K-12 grade system and that the optimum sized secondary school is 700 pupils (plus or minus 100 pupils.)

5. Livingston, A. Hugh. "Is There An Optimum Size High School?" Progressive Education, 33:156-159, September 1956.

The complexity of the problems involved in the question of optimum size for a high school makes such a determination difficult to achieve. However, weighing many factors leads the author to conclude that economy increases very little with school populations larger than 1200 students and enrollments beyond 2000 do not result in other than duplication of already existing services and experience.

6. MacVittie, R.W. "Are Our Elementary Schools Too Large?" Nation's Schools, 53:56-57, June 1954.,

The author contends in this article that large elementary schools tend to interfere with opportunitites for children to engage in social interaction. Therefore, he advocates "small elementary schools for small children in small numbers." Capacities of elementary buildings should range from 300 to 400 pupils and contain no more than 12 to 14 rooms.

7. Mauch, James E. "The Educational Park," American School Board Journal, 150:9-11, March 1965.

This article advances the idea of an "education park" as a means of satisfying the goals of school desegregation and quality education. Critical elements for an education park are size, location, and excellence and variety in program, instruction, and facilities.

8. Smith, Clifford B. "A Study of the Optimum Size of Secondary Schools." Unpublished Ph.D. dissertation, The Ohio State University, 1960.

This study has a four-fold purpose. An attempt was made to: 1) determine the relationship of secondary school size to cost, 2) to determine the relationship of secondary school size to certain program effectiveness factors, 3) to determine the effect of selected community characteristics on the size-factor relationships, and 4) to determine an optimal school size range for 3 and 4 year secondary schools in Ohio. The findings of the study indicate that, when all factors are considered, the favorable factors approach the maximum and the unfavorable factors approach the minimum when the size range of the secondary school is 800 to 1200.

A summary statement of the findings of this dissertation may be found in the September, 1962, Ohio School Boards Journal.

8. Sollars, Ralph D. "The Relationship of Size of Elementary Schools to Operational Cost and Program Quality." Unpublished Ph.D. dissertation, The Ohio State University, 1962.

   While past studies have indicated a general consensus that minimum size for elementary schools should be approximately 180 pupils, the author finds that advantages are greatest in the 300 to 499 pupil range when all indicators are considered and concludes that this is the desirable size range for elementary schools housing grades 1 through 6.

J. Health, Safety, and Sanitation

1. From School Program to School Plant, pp. 67-68, 211-212, 354-357, 453-459, and Chapter 20.

2. Guide for Planning School Plants, pp. 94-103.

3. Blatner, Henry L., and Stephans, Donald J. "Suggestions for Plumbing and Sanitation in School Buildings." American School and University, 1954-55, pp. 415-418.

   "Careful attention to allocation of space and logical use of sanitary facilities as an educational device is most important during formulation of the educational program." The authors offer 44 helpful suggestions as a guide to planning plumbing and sanitation facilities in the comprehensive school program.

4. Blundell, W. Irvin. "Health and Physical Fitness," The Nation's Schools, 54:57-59.

   A school plant well-planned with health and physical fitness objectives in mind will go beyond mere provision of sufficient space for a good program of physical education and health for all pupils and will recognize the fact that the materials of construction and equipment have a bearing on the physical, mental, and emotional growth of pupils. What to look for, what to avoid, and what to include constitute this article's contribution.

5. Finchum, R.N. and Boerrigter, Glenn C. School Fires: Prevention, Control, Protection. U.S. Department of Health, Education, and Welfare, Office of Education, Washington: U.S. Government Printing Office, 1962.

   Many magazine articles, pamphlets, and publications on specific aspects of school fires are available, but few publications

present an overview for a complete program of school fire safety. This publication brings together in one document the latest available information, research, and proven practices so that administrators and others who have authority and responsibility in this area may plan a comprehensive program of school fire safety.

6. Hixon, L.B. "A Check List for a Safer School." American School Board Journal, 124:43-44, April 1952.

   This article discusses the question of school liability where injury occurs to an individual because of inadequate upkeep and storage of inherently dangerous classroom material and school plant equipment. A 31 point safety check list is provided.

7. National Academy of Sciences--National Research Council. School Fires: An Approach to Life Safety. Washington: The Council, 1961.

   A school fire safety program must be predicated on the assumption that a fire may start in spite of all prevention efforts. Such a program must foresee all reasonable means of coping with fire and insuring against danger to life. This can be accomplished by early detection of the fire's presence, by the prompt sounding of an alarm, and by effecting swift evacuation of the threatened premises, as well as by combating the fire, controlling its harmful emissions, and guarding against accidents and panic. This publication provides information for the school plant planner concerning desirable design elements, equipment and material specifications, and fire prevention devices.

8. Quinn, R.J. "What Must be Done for Fire Safety," American School Board Journal, 138:32-34, March 1959.

   While such devices and installations as automatic alarm systems, heat-triggered sprinkler systems, and fire department inspections are important, the best fire prevention measure is excellent housekeeping. Chicago's Fire Commissioner Robert J. Quinn offers 18 recommendations for assuing a fire-safe building.

K. Multi-use Facilities

1. From School Program to School Plant, Chapter 19.

2. Guide for Planning School Plants, pp. 33-36.

3. Planning America's School Buildings, Chapters 3, 4, and 5.

4. "The Truth About Multi-Purpose Rooms," School Management, 2:40-44, April 1958.

   Multi-purpose rooms planned as an approach to economy in construction can handicap the educational program. However, by considering the basic requirements for various activities some combination of facilities with a resultant saving can be made.

L. Operation And Maintenance

1. From School Program to School Plant, pp. 123-124, 191-193, 371-373.

2. Planning America's School Buildings, Chapter 14.

3. Finchum, R.N. School Building Maintenance Procedures. U.S. Department of Health, Education, and Welfare, Office of Education, Bulletin 1964, No. 17. Washington: U.S. Government Printing Office, 1964.

   Maintenance of school buildings in an adequate manner is a problem which concerns tax payers and school officials alike. This publication identifies, describes, shows the function of and outlines the maintenance procedures for many components of school buildings.

4. "Good Maintenance Practices: A Symposium," American School and University, 1956-57, pp. 423-432.

   Plant operation is one important cog in a "wheel" designed to implement an accepted philosophy of education for a particular community. Efficient plant operation within this framework requires attention to a number of factors. These are: personnel selection and orientation, organizational arrangements, equipment requirements and public relations.

5. "Maintenance Practices: A Symposium," American School and University, 1957-58. pp. 273-284.

   A collection of articles outlines maintenance practices currently employed in various schools. Articles in this symposium are:

   1. A 5-point training program (for custodians)
   2. Maintenance practices for new school buildings
   3. Training school for custodial service employees

4. Maintaining interior painted surfaces
5. Custodial staff selection
6. Heating maintenance in Ithaca, N. Y.
7. Cutting costs in grounds maintenance
8. Supplying heat to the Detroit Public Schools
9. The importance of maintaining school grounds

6. Staerkel, W.M., and Carroll, J.M. "How to Get Repair Jobs Done Right and Done on Time," The Nation's Schools, 72:59-64, October, 1963.

   Maintenance in the public schools is not a single service. Preventive maintenance, emergency maintenance, major and minor maintenance are all facets with differing purposes and calling for varied competencies which must be organized and administered into a carefully controlled program. The author of this article offers suggestions as to how to accomplish this organization and administration. Charts included illustrate a weekly master schedule, a time accounting form, a blueprint for collecting information about the various jobs performed, and a summary of what one should know to make sound maintenance plans.

7. State of Florida, Department of Education, School Plant Operation and Maintenance Programs in Florida Counties. Tallahassee: The Department, 1959.

   This is a report relating to the salient aspects of county programs of school plant operation and maintenance. The purpose of this publication is to give information to school administrators, school boards, maintenance supervisors, custodial supervisors, and all others interested in operating and maintaining school plants.

8. "Symposium: Good Maintenance Practice," American School and University, 1952-53, pp. 406-412.

   A collection of short articles on maintenance and operation practices. Included articles are:

   1. "We Reduced Dust on our Concrete Floors" - William Mallwity - use concrete preservers and seals.
   2. "Our 5-year Custodial Plan" - William H. Rodgers - a discussion of the Scarsdale, New York 5-year plan of building maintenance.
   3. "When Building the New School" - W.P. Christensen - a list of recommended practices to be followed in construction of school buildings which will effect ease of maintenance of the rooms and spaces in and about the school building.

4. "Cooperation For Better Maintenance," - John B. High suggest creation of a "tight little group" of maintenance people as a morale maintainer.
5 "Community Clean-up Campaign" - R.J Bromley - use school children in community clean-up campaign

9 Viles, N.E. "Maintaining and Replacing Schools," American School Board Journal, 141:22-25, 49, July 1959.

Attributes of advance planning which help delay school depreciation are three-fold First, by planning for program changes and population increases, one plans for expansibility. Second, the development of a suitable design coupled with good workmanship and the use of proper materials provides durability. Third, by making many areas serve many purposes one creates flexibility. Nevertheless, depreciation will occur. The author offers a wealth of materials on many phases of school maintenance and operation. See especially his cycle of deterioration.